American Machinist

A McGraw-Hill Publication . . . Established 1877

New York, January 2, 1930

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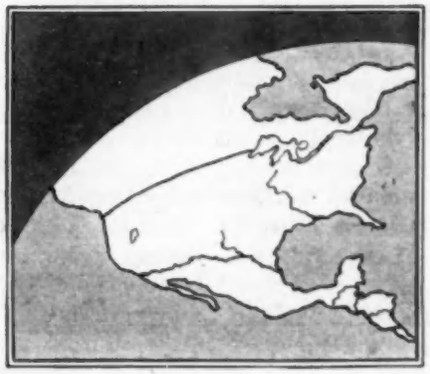
Will Nineteen Thirty Be as Good as Nineteen Twenty Nine?



By K. H. Condit

Editor, American Machinist

BEFORE any attempt can be made to answer the question facing every business man and manufacturer at the beginning of the new year, we must have some sort of a measuring stick. In other words, before we do any comparative estimating for 1930, we must know how good 1929 was for the business world.

December figures are not in, of course, but we can form a fairly close estimate from the records of the first ten or eleven months of the year. To do this we have three statistical sources to which we can turn: the *American Machinist-Electrical World* statistics on industrial activity as measured by the purchase of power from public utilities; the barometric order chart of the National Machine Tool Builders' Association; and the Bureau of Foreign and Domestic Commerce records of exports of machinery. The three do not cover exactly the same fields, but they should indicate trends that can be co-ordinated.

The best indicator of activity is the record of purchased power. It is the most sensitive, because the power bill is readily controlled by the buyer, and is not affected by the sentimental or altruistic factors inherent in payroll statistics. In most of our plants today every effort is made to keep up the payroll as long as possible, both because of the soundness of the principle that good pay means sustained purchasing ability, and because of the feeling that faithful service deserves consideration. But power is a commodity, and no manager will buy more than he actually needs.

On this basis, then, 1929 set a new high record of industrial activity in the machinery and metal working field. It exceeded the 1928 peaks in every month up to November, when the stock collapse frightened manufacturers into an abrupt decrease of activity. For the year, and making due allowance for what may happen in December, the gain in activity was about 12 per cent over 1928.

Turning now to the chart of orders for machine tools we find other evidence that 1929 was a record year. Until December figures are in, it cannot be said positively that business booked in 1929 constituted an all-time record for the whole industry, but there are companies that have accepted more orders in the first eleven months of the year than in any previous calendar year.

The curve of orders reached a peak in May and declined gradually from then until November, when it made

an even more precipitous drop than that in the curve of purchased power. November was off nearly 50 per cent, a striking proof of the effect of uncertainty on business planning. As a barometer of declining general business the machine tool order curve once more proved its reliability.

No figures are readily available to show just what proportion of the products resulting from all this record activity were for domestic consumption, and what proportion was for export. By far the greater part, of course, was for home consumption, but the actual dollar value of what went overseas rose surprisingly in 1929.

From the report of the Secretary of Commerce we learn that "for the first time, the value of exports of automobiles (including parts and accessories) and of machinery both crossed the half-billion line, the former reaching $591,000,000 and the latter $563,000,000." It should be remarked that these sums are for the fiscal year 1928-29, which runs from July 1 to July 1. For the calendar year 1929 it is entirely possible that the figures will be considerably larger. The gains were of the order of 39 per cent for automobiles, and 21 per cent for machinery. Other products of metal working plants are not definitely segregated, but they would add appreciably to the total.

Obviously, any chief executive of a metal working plant who is not aware of what is going on in the export field should take immediate steps to educate himself And before rushing in to secure some of this export business he should be entirely certain that the little matter of education has been taken care of. Attempting to get such business without learning the ropes is one of the very quickest ways to drop large sums of money. Several articles giving basic information on the export situation are scheduled for early publication in *American Machinist*.

ALL THREE of our measuring sticks show that 1929 business was exceptionally good, probably record-breaking. Should we expect 1930 business to be as good, or better, or worse?

If there were no disturbing factors to be considered, business in the metal working field should increase each year by an amount somewhat greater, expressed in percentage, than the growth of business in the country as a whole. The reason for expecting growth at a higher rate is the accelerating mechanization of everything that goes to make up the material side of modern civilization. It is the task of the metal-working industry to design, produce, and service the machines upon which all of us depend so much.

General business is now expanding at an average rate of between 4½ and 5 per cent each year. It may expand faster in good years, and may even drop back a little in poor ones, but the average is maintained. We should therefore expect the metal working industry to grow somewhat more than 5 per cent a year.

It certainly grew considerably more than that in 1929. And what is more, it grew at a considerably faster rate. This point must be considered because, as remarked before, we do not know just what the average rate is for this particular industry. If the rate is considerably accelerated in any one year, the chances are at least even that it will be slowed up in the succeeding year. Reasoning in this way we should expect 1930 to fall somewhat short of 1929, everything being normal.

BUT WE have not considered the effect of the stock market collapse on 1930 business, nor the effect of the Washington conferences on the business cycle. Is it going to be possible to avoid a serious recession by working through the various business and trade associations of the country? Can such co-operation accomplish what would have been believed a few years ago, to be an attempt to override economic laws?

The answers to these questions are hidden in the future, but we do know that the immediate effect, even in the outlying sections of the country, was distinctly favorable. Business men who were uncertain, worried, over cautious in the week after the panic have regained their balance and are intelligently optimistic. They know that underlying conditions are sound, that there are no excessive stocks of materials to be liquidated, that equipment builders are still working on back orders.

And they are calmly confident that, while business in 1930 may not reach the record heights of 1929, it will surely equal the satisfactory volume of 1928.

In thus stating the general opinion of the outlook for 1930 we must not overlook the fact that opinion covers the year as a whole. No one is foolish enough to believe that the first quarter of 1930 is going to be a boom period. Every effort is being made to keep plants operating at a rate that will prevent unemployment during those months when unemployment may be accompanied by suffering. And there is every reason to believe that the efforts will be successful, because many plants have enough unfilled orders to keep them going at nearly full speed until the second quarter.

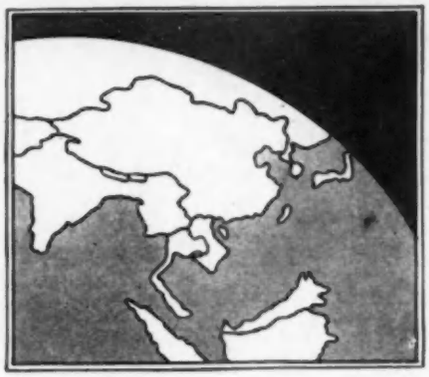
The first quarter will provide, however, a breathing space from the high tension of the last 18 months, a chance for executives to go over their plant and equipment, analyze its usefulness, and decide what units are no longer efficient and should be replaced.

Orders for equipment placed in the next few weeks can probably be filled within a reasonable time, and the equipment can then be set up, run in, and made ready for efficient production when it is needed—which may be a lot sooner than the conservatives expect. Don't forget that the hand-to-mouth buying that has been the practice for several years will be a potent factor in shortening the recession period. Thanks to greatly improved railroad operation and consequent shortened deliveries, stocks of materials are in no case excessive.

Another factor that will have its effect on the present

situation is the machine tool exhibition which was held by the National Machine Tool Builders' Association in Cleveland in October. This exhibition, which was the second staged by the Association, was the year's high point of interest in so far as men in the metal-working industry are concerned. Many thousands of executives and buyers studied the equipment at that show and made up their minds as to what they needed to modernize the equipment in their own plants. Some orders have been placed but many more are still to come.

Many of the exhibitors at the show were very doubtful of the advisability of holding such a show at a time when the industry was working at the highest rate in its history. They felt that they could ill spare the time and effort from their regular production activities. But subsequent events proved that the exhibition was timely in that it showed buyers the great advances in machine tool design and stimulated their desires for the new models.



Turning to other branches of the metal-working field, we find that all of them did well up until November. A new record for automobile production was set in 1929, thanks largely to the return of the Ford factories to full production. Although some observers have expressed the opinion that there would be a pronounced drop in production in 1930, those in the best position to know do not anticipate more than a ten per cent recession. Who is going to make and sell all these cars is another question. Some redistribution of selling quotas is inevitable. Several of the weaker companies will drop out as a result.

FURTHER consolidation of railroad repair shops took place in 1929, and more consolidations are in prospect for 1930. The mists surrounding railroad consolidation on the scale visioned by Congress and the Interstate Commerce Commission are beginning to clear. It would not be a surprise to have some definite action taking place during the new year.

Production of airplanes in 1929 went ahead blissfully regardless of markets for the product. What the November stock panic did to airplane stocks is evidence of the unsound structure that had been raised on optimism. One wise commentator remarked recently that mankind had been tied to the surface of the earth for a million years, more or less, and that the habits formed in that long period could hardly be changed in a year. The results of the Guggenheim safety competition, which should be announced early in 1930, may be very important in reducing the hazards of aerial transport and thus accelerating public acceptance of this means of travel.

The achievements of the Graf Zeppelin in 1929 did much to increase confidence in lighter-than air craft for long distance transportation. New models now under construction in this country and abroad will be far superior to the Graf Zeppelin, the dimensions of which were limited by available hangar space. Orders are reported to have been placed for dirigibles to be used in transpacific and transatlantic navigation.

Of perhaps greater significance to the metal working field was the completion of the first all-metal dirigible, jocularly known as the "tin bubble." This experimental model was tested and accepted by the Navy, and work has been started on a larger one. If the first promise of this new type of airship is fulfilled, a new metal working industry is just opening up.

Another important 1929 development in aeronautics was the tremendous Dornier flying boat. Off the water in 33 seconds with a gross weight of 88,000 lb. in a recent test flight, this big boat is designed to carry 100 passengers and the necessary fuel and oil for a 6-hour flight. What 1930 may bring forth is something to stir the imagination.

The electrical manufacturing industry has grown steadily during the past year and is now second in importance only to automobile manufacture as a field of metal working. Most of the public utilities will have to add to their generating plants during the coming year to meet the demands of the regions they serve and all of the generating and consuming machinery must be built in metal working plants. For 1930 there is every reason to believe that this relatively young industry will continue its expansion.

The general industrials, so-called, where the other smaller divisions of the field find a classification refuge, did not reach the heights attained by the automobile manufacturers, nor did they descend to equal depths in November. As a classification unit this group is so diversified that it is not subject to wide fluctuations. What will happen to it in 1930 depends largely on how successful the Hoover Washington conferences have been in dispelling psychological depression. The first move of the steering committee, in calling for a concentrated effort to modernize equipment, will certainly be helpful to the equipment makers.

One of the real engineering achievements of 1929 was the reorganization of American standardization work. The American Standards Association, which supersedes the old American Engineering Standards Committee, will work along vastly simpler and more expeditious lines, and will have the great advantage of a fairly adequate budget. With standards work on an efficient basis we can look with confidence to some real production and distribution economies in 1930.

Research work, unfortunately, is not at all centralized in the metal-working industry. Good work has been done in some plants in 1929, but the chances are that much duplication of effort is going on. If only some means could be found this next year to centralize, direct and stimulate research in the field of metal cutting much good would ensue, and 1930 would go down in history as a year of real accomplishment.

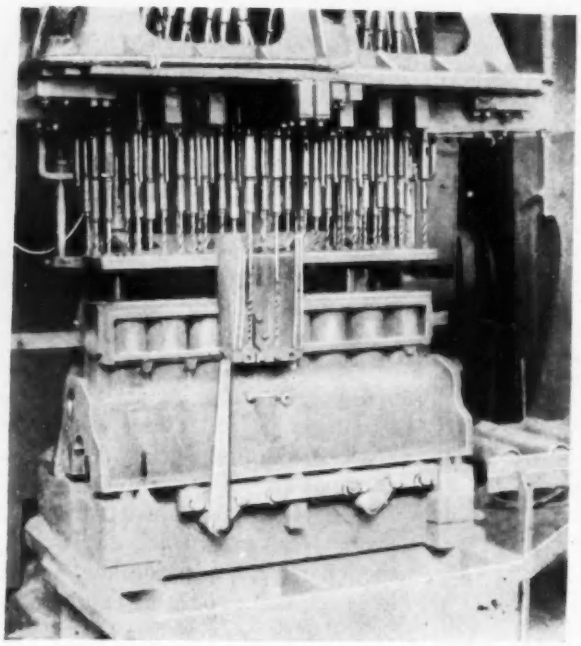


Fig. 1—Drilling all the holes in the top of cylinder block

High Spots in the Pierce-Arrow Cylinder Line

By Fred H. Colvin
Editor, American Machinist

Special machines and fixtures for producing straight 8-cylinder blocks

CYLINDER blocks for the new Pierce-Arrow engine are cast at the Studebaker foundry at South Bend, being rough bored and faced before shipment. This rough machining practically eliminates rejections after the cylinders reach the machining line, which is continuous, with a capacity of 80 to 100 blocks and heads per 8-hr. day.

After grinding both tops and bottoms of the blocks, they go to a horizontal boring machine equipped with a special head, where the crank and camshaft openings are rough bored. The fixture carries brackets on the side to act as outer supports for the clamps.

Next comes the drilling of a continuous oil distributing passage through the block, from which, leads are taken off to the different bearings. The hole is drilled from both ends with extra long drills. Supporting bushings are provided to prevent deflection of the drills between the chuck and the bushing in the fixture. Automatic stops throw out one drill, and then the other, after the second has broken through into the hole left by the first. The stop on the front of the bed is adjustable for length, by a turnbuckle, and for position, by clamps on the bed. Each drill head is controlled by a separate lever, both of which are seen in front of the stop bar.

Push rod bosses are then milled, and the block goes to the milling

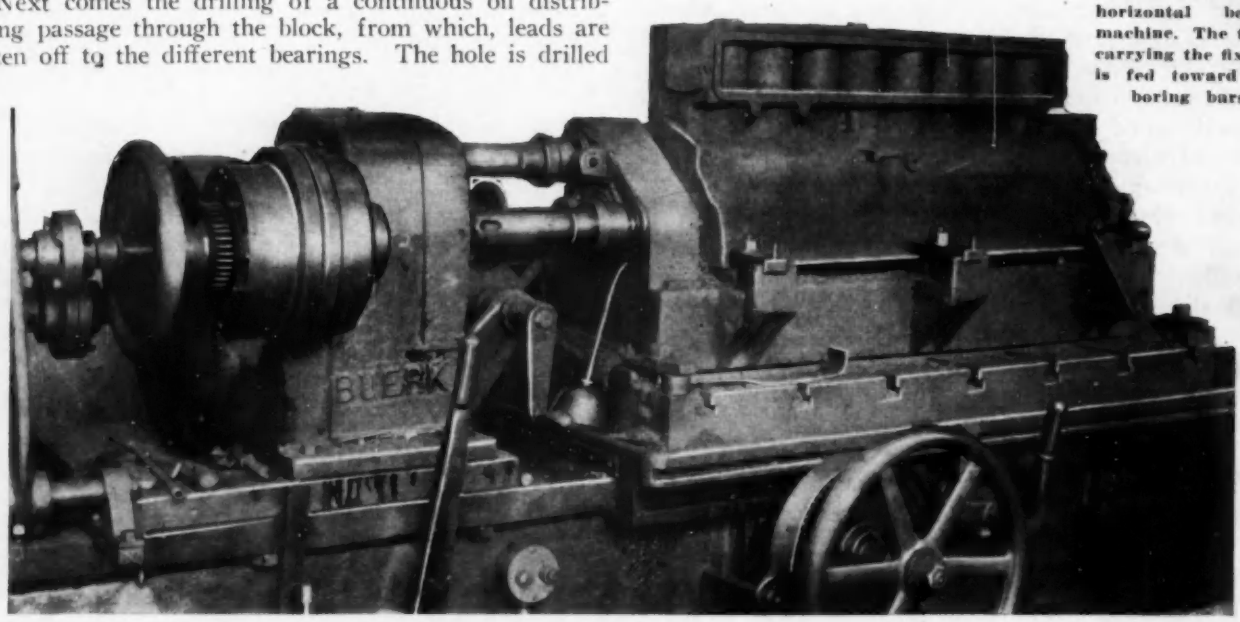


Fig. 2—Boring cored holes of crankshaft and camshaft, using a special head on a horizontal boring machine. The table carrying the fixture is fed toward the boring bars

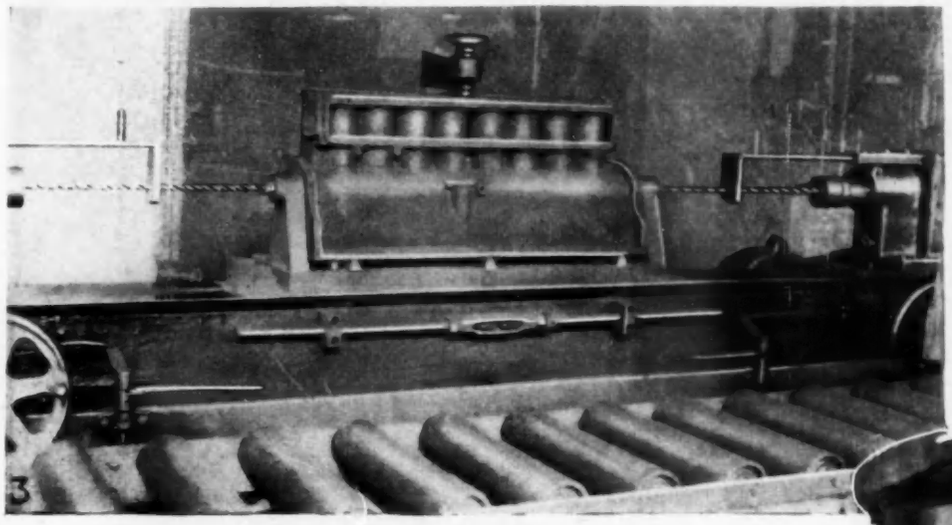


Fig. 3 — Drilling main oil passage the entire length of the cylinder block. The two drill heads feed toward the center

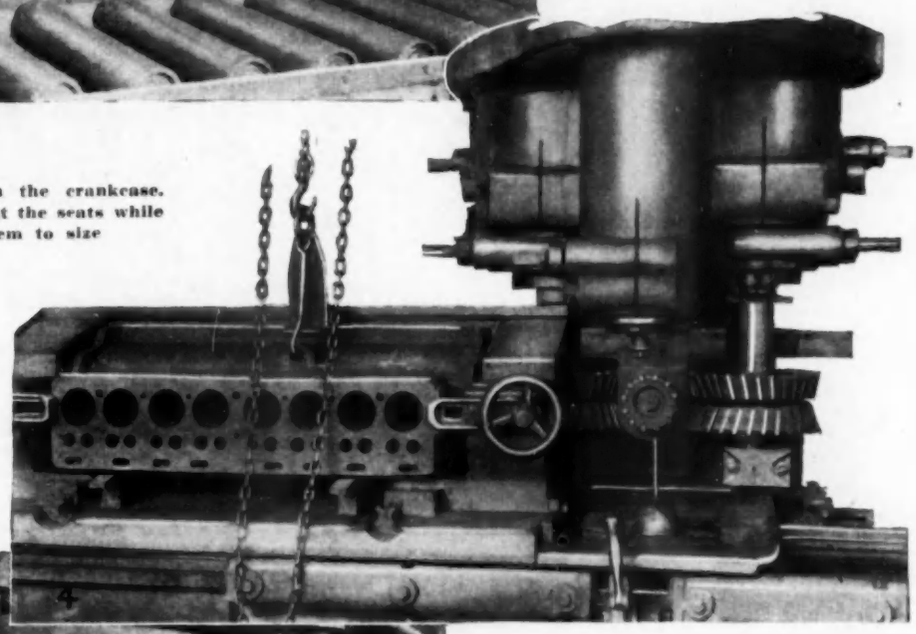


Fig. 4—Milling bearing seats in the crankcase. The first pair of cutters roughs out the seats while the second pair finishes them to size

Fig. 5—Rough boring the eight cylinders at once. Boring bars are guided at both ends, and are provided with hardened bearing strips

machine, where two pairs of large milling cutters rough and finish the sides of the crankshaft bearing seats in the block; the small cutter finishes the bottom of the seats, or locks. This is a somewhat unusual arrangement of cutters in which all three spindles are well supported in a very compact arrangement. The blocks are located by dowels at the corners, and the hooks show how easily the block can be handled in and out of the fixture.

Following this, the valve chambers are rough bored, valve guides drilled and rough reamed, after which all holes in the top of the block are drilled. The holes in the side opening, that accommodate the oil filter, are drilled at the same time by means of the extension guide arm and bushings shown in front of the main bushing plate. This illustration also shows the way in which the roller conveyor is carried through the drilling fixture. After the block is in position, the rollers drop out of the way as shown; and when the drilling is completed, a movement of the lever to the left raises the block on the rollers so that it can be easily moved to the next machine on the conveyor at the left.

Six oil hole leads are drilled into the main oil passage that was shown being drilled, in Fig. 3. The fixture that handles these six holes is seen with the cylinder block tipped at the proper angle to give access to the

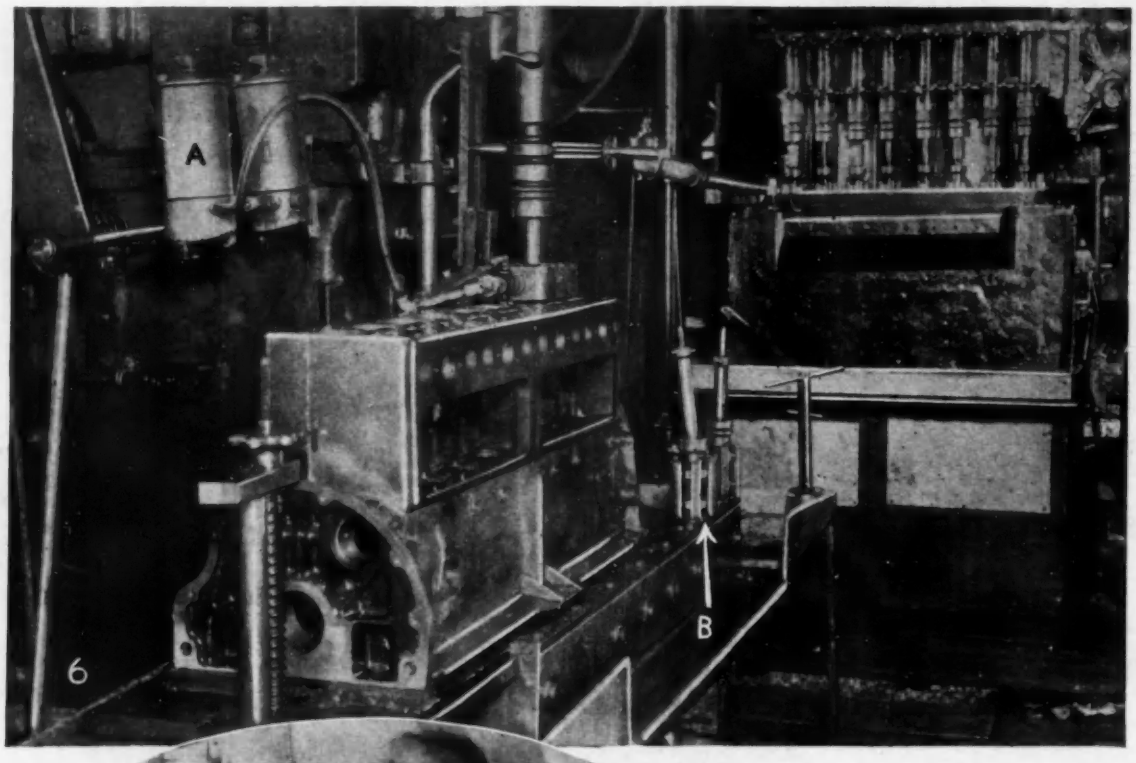
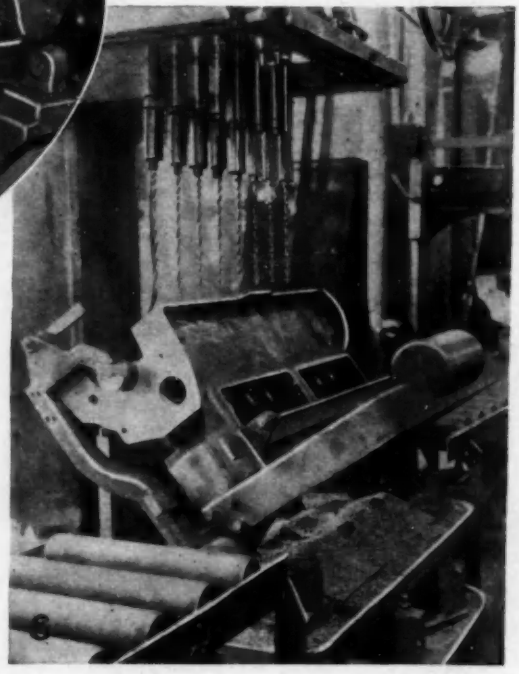


Fig. 6—Honing the cylinder bores. One machine hones all eight bores at once, the other uses a single hone to correct slight differences

Fig. 8—Special tilting fixture for drilling oil holes in main bearings. Drill bushings are located in the bar shown in the crankshaft bearings

Fig. 7—Fixture for straddle milling bearing caps at the same set-up used in milling the bearing seats in the crankcase



main oil passage. The bar supported by the arm from the back of the fixture, which carries the six drill bushings, fits into the bores for the crankshaft bearings and locates the block for this operation. The counterweight in front makes it easy to handle the block. Here again the roller conveyor handles the block as it goes down the line.

Straddle milling the bearing seats in crankcases is common practice. The Pierce-Arrow engineers have, however, gone a step farther by milling the sides of the bearing caps on the same machine. The fixture in Fig. 7 has the same general outline as

a cylinder block and goes in the milling machine in the same way, being handled just as though it was a cylinder block instead of a fixture. In the fixture illustrated, the way in which the caps are held can be seen clearly at *A*. The other stations are vacant to show the hardened locating pins and the clamps. As this bearing cap fixture is interchangeable with the cylinder block itself, it is easy to equalize production by alternating a block and a set of caps in the milling machine. The cap fixture is loaded behind the milling machine and is then rolled into line, the set of caps milled, unloaded out of the line, and again returned to the machine.

Cylinder boring is done in the vertical machine, Fig. 5. Here again the roller conveyors form part of the machine, thereby making it possible to handle the blocks easily and quickly. The rollers are mounted in side-bars that are raised and lowered by

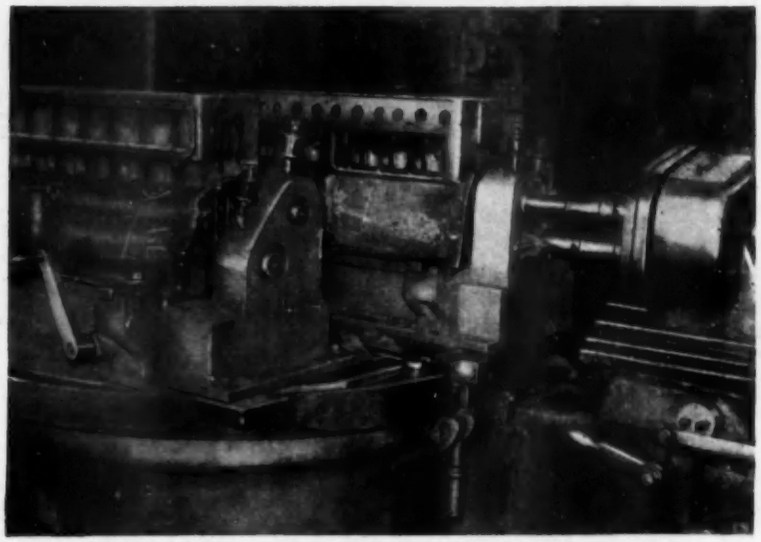


Fig. 9—Rough and finish boring crankshaft and camshaft holes on a rotary boring machine. One set of bars rough bores, the other finishes

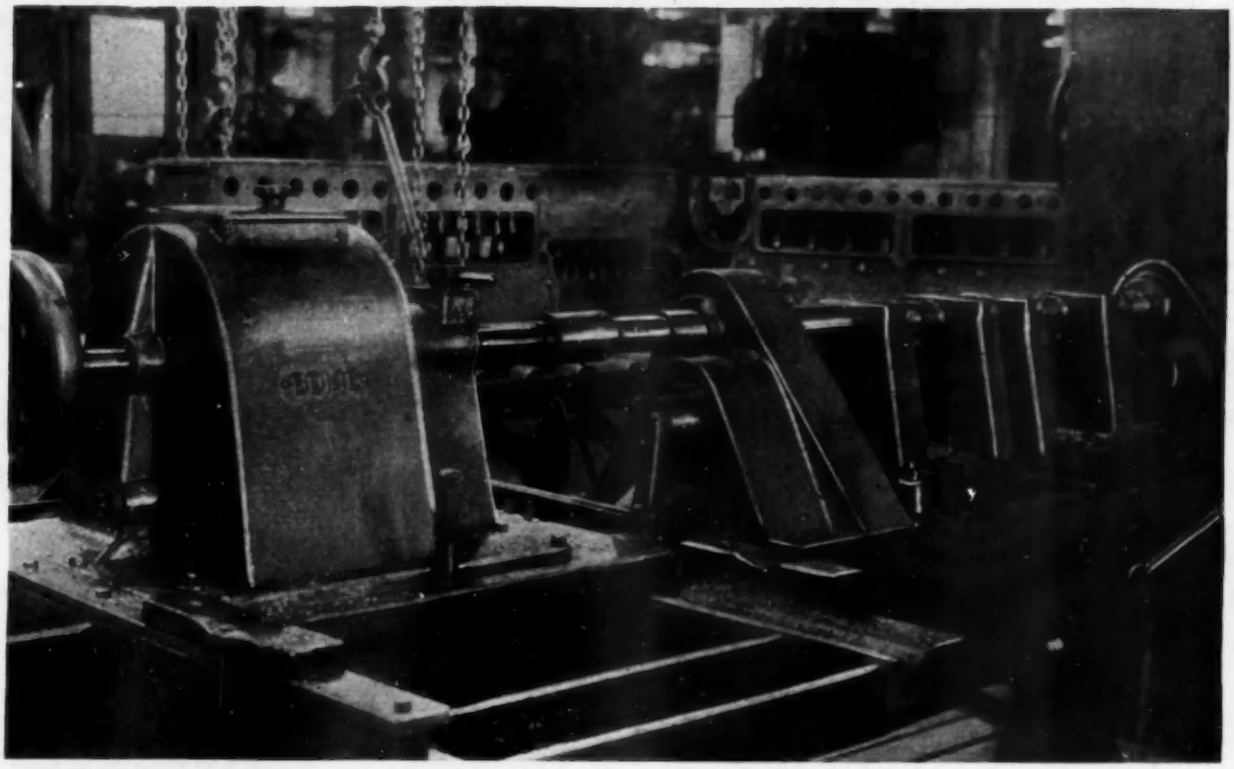


Fig. 10—Fixture for finishing the main bearings with a line reamer. The block is located by dowels and plugs in the camshaft bearings

lever *A*. The boring bars are guided both top and bottom, hardened guide strips being provided on the bars for bearing surfaces in the guide bushings. The lower guide bushings are lubricated by Alemite connections *B* that extend out from the fixture.

Crank and camshaft holes are bored on the rotary-table machine in Fig. 9, after which the camshaft hole is reamed on a horizontal boring machine.

Cylinder bores are finished by honing, using a rigid grinding head. The first honing is done in the 8-spindle machine at the right while the final finish is given with the single grinding head at the left. The type of head can be seen at *B* on the machine.

The final line reaming of the camshaft bearing seats is done in the fixture and machine in Fig. 10. The block is located by the crankshaft bores on the heavy plugs shown at the end, while the finishing reamers are fed through the camshaft bearings by the fine pitch screw at the left. The blocks are then ready to be washed, sprayed, and baked, and to have valves, valve springs and the cylinder heads assembled before they leave the machine department for the assembly line.

EXECUTIVE · FORUM

The Ratio of Raw Materials to Production

THE LAST two paragraphs of the letter he had been reading and re-reading now monopolized the attention of James Hobson Wickard, president of the Advance Foundry and Machine Company:

"As to the preliminary inventory figures which you have so kindly furnished, we are of the opinion that they are subject to reduction. We have no particular criticism to make concerning the work-in-progress and finished-goods figures, because we understand that your company was compelled to accept certain cancellations during the months of November and December. But when your raw-materials inventory continues to show a figure more than double your average monthly producttion during the first ten months of 1928, we must submit that the ratio of raw materials to production is unwarrantably high.

"In conclusion, we regret to advise that we shall not be able to absorb further commitments from your company until such time as we can review your certified audit.

"Yours very truly,
"FIRST NATIONAL BANK,
"Oliver V. Farwell, Vice-President."

Wickard could not believe his eyes. He felt at once misjudged, mishandled, wronged, and very foolish. Why, his supply of raw material just gave him a cushion against which to operate economically. Yet here it was questioned—and by the bank. He decided to talk to his purchasing agent, reached for the telephone, and changed his mind. After all, his P. A. had only been carrying out instructions.

"I'm stuck," he admitted to himself, "And I certainly hate to talk this matter over with the boys here at the plant. I'm going to have to call on that old fraud, Bill Holland, again. Maybe I can find him at the club."

He looked at his watch. Methodically he stuffed papers into a brief case, put on his overcoat and hat, and made off.

"Bill," he said to William Holland, as he found the old adviser to industry stretched almost too comfortably in an armchair before the main fireplace at the Union League. "You've got to give me another lift."

"Why, Hello, Jim," Holland replied cordially, albeit sleepily, "What's on your mind? Can't you let an old fellow take forty winks after lunch?"

"Confidentially, it's the bank. Farwell is questioning my raw-materials inventory, and he is going to hold me down until he gets audited figures.

"That so? Have you got the preliminary figures with you? Let's see them."

Holland scanned them with practiced eyes.

"Jim, the bank is right. You always have been 90 per cent super-salesman and 10 per cent manufacturer. At 80 tons or so a day maximum, you've got pig iron enough to run you through until spring. Why, you've got enough shapes and flats to carry you through April. That's not modern buying, when you can get overnight service out of warehouse stock, and seven day shipments out of the mill. Better read your trade magazines.

"Got a piece of paper? I'll give you the same schedule I gave Adamson. Check it against your practice—modify it where you absolutely have to, but put it into effect. Guess I'll have to drop in and see you more often."

What Do You Think About This Executive Problem?

What schedule do you think Mr. Holland placed in Mr. Wickard's hands? What should it be? How much of a "cushion" should Advance Foundry and Machine maintain?

What has been your actual experience with high inventories? With low?

The *American Machinist* invites bona fide executives to write in their answers to this executive problem for publication.

DISCUSSION

OF PREVIOUS PROBLEMS

What Should We Teach Apprentices?

Practical experience forms an important part of an apprenticeship course. Certain machines in each group may be set aside for the use of apprentices if new boys are continually coming into the shop. The apprentices can be transferred from machine to machine as long as this plan does not interfere with the carrying out of production schedules.

If the foreman cannot give detailed attention to training the apprentices, sub-foremen should be chosen to train them. Each man need teach only the operation of the machines in his section. Usually, a fairly young man with some theoretical training is best for the job.

If apprentices cannot receive their theoretical training in the local schools, or through classes established by a group of employers cooperating in the locality, an executive at each plant may conduct classes, say for two hours a day, twice a week. Among the subjects which should be taught are shop mathematics, applied mechanics, elements of machine design, followed by a course of training in the drafting room, designed to teach the principles, construction, and operation of machine tools, methods of gaging and inspection, underlying principles of metal cutting, specifications and testing of machines, tools, and parts, construction of various types of drives, lubrication, metallurgy, molding and casting of ferrous and non-ferrous metals, something about prime movers and their auxiliaries, and electrical apparatus. —H. JAMES, *Birmingham, England.*

Hiring Back Old Men First

Every year or two a certain small industry in the eastern part of the United States is forced to suspend a large part of its operations because of lack of the management of sales activities. In laying off its men, this company does not consider how good the men are, or how long they have been in the service, but looks only at the fact that they are working on operations which it is necessary to tie up. The men are therefore let go without any consideration whatsoever.

No record is kept of the way in which the men have increased in value to the company during their period of employment. When business picks up again the company forgets that these men have ever worked for it, and, with little forethought, runs help-wanted advertisements in the newspapers of its own and neighboring cities. As can be expected, the men thus hired are the scum of the mechanics along the eastern seaboard. Former employees would rather accept jobs elsewhere at lower wages than to return only to receive the same unjust treatment when the next slump comes.

This method of operation costs the plant thousands of dollars that it could save by the establishment of an effective personnel department. Loss of production, spoilage of work, and damage to machines and tools would all be reduced under such a plan. Moreover, the fact that former employees could be induced to return would develop good will towards the company.
—FREDERIC A. J. SCHMIDT, *Industrial Engineer, Western Electric Company, Inc., Kearny Works.*

The Night Shift

For the married man, night work means being away from home at the time when he should be with his family. For the single man, it means giving up pleasures and recreations forming a welcome change from work. In both cases, a feeling of dissatisfaction eventually arises and is reflected in a man's work. He begins to look for a day job.

A higher rate of pay may overcome this feeling for a short time, but money cannot take the place of the recreation a man misses. A more satisfactory method of operation is to run two shifts, each working nights on alternate weeks. This plan avoids putting new men on the night shift as a regular assignment, which is a usual custom. The older employees who are not attracted to night work are, however, willing to work nights because of the plan of alternation, and because they receive extra pay during the weeks when they are on the night shift.
—F. C. TWIST, *Oshawa, Canada.*

Friendliness in Business

An interesting evidence of business friendship came to my attention recently. The vice-president of a large jobbing firm is an ardent trout fisherman. One of the officials of a customer concern likes to eat these fish but cares little about catching them. It so happened that I was in the office of the fisherman one morning when he called his friend on the long distance 'phone and told him about a good catch he had made. The response was that the friend would drive up that evening, some forty miles each way, after the fish. The fisherman countered with the statement that he was going to deliver them, because he was coming down that way on business.

I expressed the opinion that fish and business made a strange mixture, and wondered where the jobbing firm came in on the proposition. From the reply received it seemed that the firm fared very well. The buyer was well satisfied with the product of the seller, which made business deals satisfactory. The fish served merely as a maker of friends, and to a small degree minimized the chance of allowing competing firms to get in on some of the business. This type of conduct in business would be strongly opposed by Mr. Armstrong, who figures in the narrative, but good fellowship among business men is here to stay, and business will be better for it.

L. F. SWENSON, *Industrial Engineer, Perkins Machine & Gear Company.*

Climbing Cycles of Industrial Production

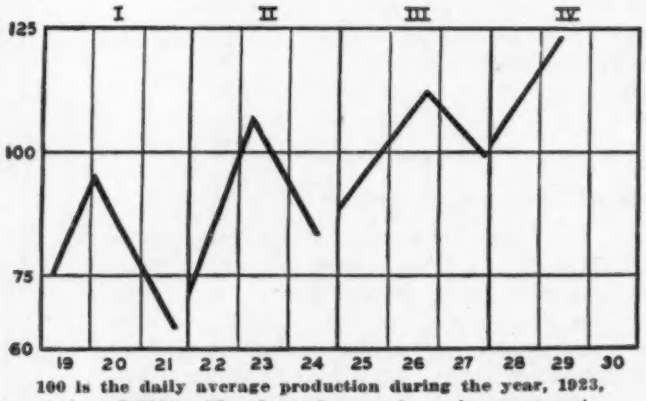
By ALVAN T. SIMONDS
President, Simonds Saw and Steel Company

At a time when the nation is recovering from a stock market gyration of major proportions and its resulting temporary scare to business, the bulletin, "Looking Ahead," by Mr. Simonds, published September 1, 1929, may be of interest. It is noteworthy in that it predicted exactly what might happen—and what did happen

STATEMENTS about business are often misleading; for to each business man, business means his own business. "Business was never better," was a frequent remark in the first half of 1929. To it, the steel man and the automobile man replied, "That's right," but the builder and the farmer said, "Bunk." Therefore, we prefer to speak of the volume of industrial production as reported by the Federal Reserve Board instead of that reported by business or general business.

Industrial production, reported monthly in the Federal Reserve Bulletin, does not include agricultural production or fisheries. It includes manufactures and minerals, and "represents nearly 80 per cent of the total industrial production of the United States." When we say "Industrial production increased in volume from January 1 to June 1, 1929," the statement is perfectly clear. As it is in volume and not in dollars, it does not need to be adjusted or changed with the changing value of the dollar. On the chart we show the major movements of industrial production as straight lines, omitting minor fluctuations. The result is three completed cycles and the present incomplete cycle. The climb of the peaks of these cycles, 1920 to 1923, to 1926, to 1929, is striking.

Is your business, like ours, wholly dependent upon



100 is the daily average production during the year, 1923, 1924, and 1925. The chart shows only major movements. See Federal Reserve Bulletin, February, 1927, and current issues for detailed data

industrial production? Does it increase with industrial production and at about the same rate? Then your business should show cycles similar to the above.

Note the following facts, as shown by the chart:

1. Each cycle is of three years.
2. Each successive peak is higher than the preceding peak.
3. Each successive peak comes later in the year than in the preceding cycle.

Now, regarding the present so-far-incomplete cycle. Is this to be of three years? The peak already is higher than any preceding peak. Is the peak in 1929 to come later in the year than that in 1926 or has the peak already been reached in June, 1929? Other questions will arise out of a further study of the chart.

Fill in the present incomplete cycle as you believe it is going to develop. Then if you have sufficient confidence in your prediction, plan and conduct your business accordingly.

What really troubles business management most at present is, simply, that the higher the prices of securities go, the more difficult it is to earn a satisfactory return on the higher basis. There is no trouble in making plenty of money when times are good, but the difficulty is that when values discount *probable* future earnings, they usually go too high. Business has never remained continuously good for any great length of time and probably never will. Just when a turn may come, nobody knows.

As we look ahead at industrial and business conditions, perhaps the most important question is whether or not the Federal Reserve Board will be able to control the use of credit and keep at a reasonable point the cost of borrowing money for use in commerce and industry. The Reserve System, when it was adopted, was expected to do this. It was also expected to eliminate bank failures among its member banks. It was also hoped that few if any banks would find it profitable to remain outside the System. The root of the plan was protection for all who entrusted their money to the banks.

The primary function of government is protection of life and property. For this end are organized and maintained the police, the army, and the navy. Every citizen is bound to assist any of these government forces when called upon to do so. The Federal Reserve System was organized to protect American citizens, banks, and industries against money panics and consequent recurring hard times which have brought upon nations perhaps greater misery and sacrifice than war. Why then should not citizens and financial and business corporations and institutions feel called upon to rally to the support of the Federal Reserve Board in its efforts to preserve and continue prosperity and general welfare? In particular why should not the member banks give full support to the Federal Reserve Board in its policy for such control of credit as is specified in the Federal Reserve law? Is support of the Federal Reserve Board to depend upon our approval of its decisions? Is the Federal Reserve law to be classed with prohibition enactments?

Our duty is definitely to support the government as represented by the Reserve Board. We shall do well to watch and study the situation as it develops, for it promises to bring before Congress and the country one of the most perplexing and most sharply contested post war financial issues. Upon the settlement of this issue may depend industrial, commercial, and financial prosperity in the United States for years to come. Upon it may depend the standard of living and the welfare of millions of the "common people." A new patriotism, perhaps a higher patriotism, is called for, especially on the part of some of those of great financial influence.

Welding Drive Wheels

By Frank J. Oliver, Jr.
Western Editor, American Machinist

The Chicago & North Western has developed an automatic welder for locomotive wheel repairs

THE PRACTICE in the Chicago & North Western Railway shops is to remove the tires and to check the fit and the shape of the driving wheel center in all cases when a locomotive is down for repairs. Removal of the tire, or its replacement, is performed with the aid of a gas-fired ring in the usual manner, as shown in Fig. 1. The gas jets are spaced at about 3-in. intervals, and almost two-thirds of the heat is directed against the flange where there is the greatest mass of metal. It takes about 15 min. to expand a tire sufficiently to loosen it. Old tires are never rebored, but the outside diameters are turned down to compensate for flange wear until the minimum thickness, as specified by the I.C.C., is reached after which the tire is scrapped. New tires are bought rough turned, and the only machining operation necessary is to turn them to a standard diameter, depending upon the size of wheel.

If the wheel centers are found to be true and the tire is within the wear limits, shims are used in replacing the tire in order to obtain the requisite shrink fit. For determining this shim thickness a direct-reading gage has been developed. It is shown in Figs. 2 and 3. According to the size of tire, different length gage rods are used with the micrometer head developed particularly for this work. One end of the gage rod is tapered and has a ball point, the other is threaded to receive the head shown in detail in Fig. 3. This head has a hollow end split longitudinally in three places and threaded both inside and outside. The threaded end of the gage rod is screwed into the internal thread and is locked in position by the knurled sleeve *A* screwed on the external thread. On the other end of the head is the pointed contact member *B*, which is also adjustable and which, in addition, carries an index arm that registers on the periphery of the drum *C*, which is graduated in thousandths.

In operation, an outside gage is set to the wheel-center diameter, and the inside gage just described is set to the dimension of the outside gage. In making this setting, the operator slips a shim *E*, Fig. 3, representing the standard shrinkage allowance, under the tip sleeve and makes his adjustment at the screw connection between the gage rod and the head, setting the index arm to zero.

A different shim is available for each size tire and is roughly 0.00125 in. thick for each inch of diameter, to give it the desired press fit. Shim *E* is then removed and with sleeve *A* locking the adjustment at that end of the head, the inside diameter of the

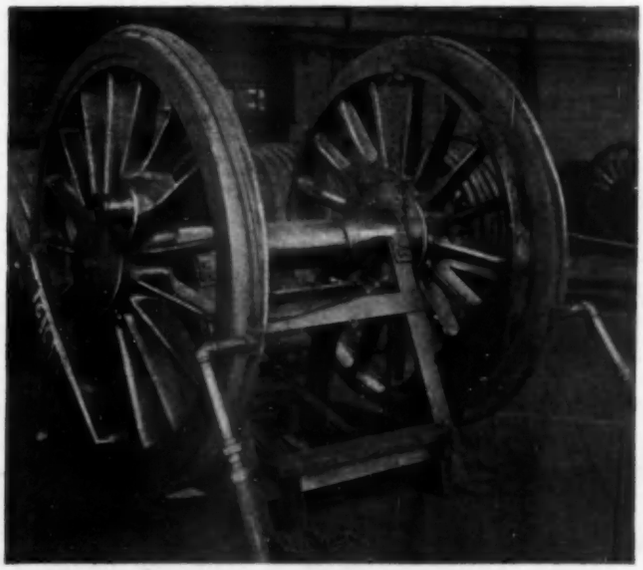
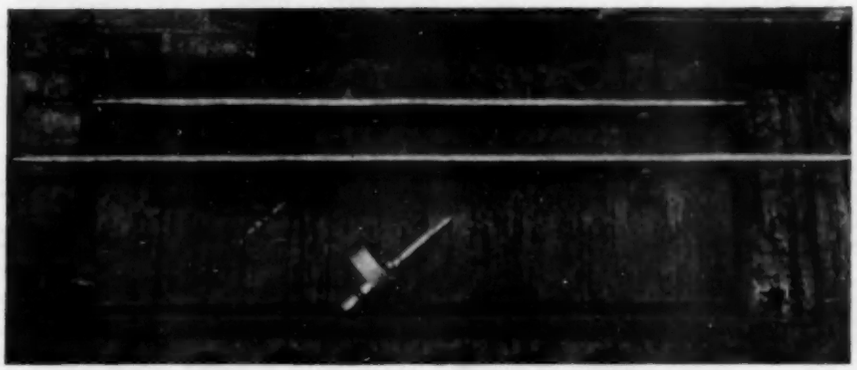


Fig. 1—Closely-spaced gas jets, largely concentrated on the flange, are used to expand locomotive tires for removal or replacement



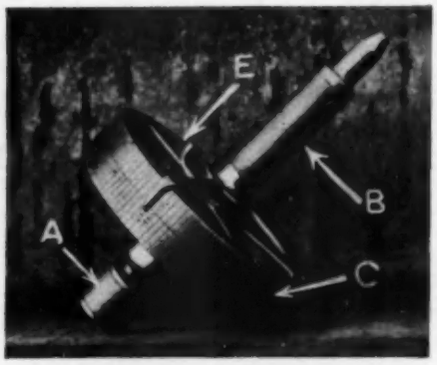


Fig. 2—Set of gage rods and head for tire gaging. Fig. 3—Close-up of the gage head showing the standard shim E employed to obtain a uniform shrink fit

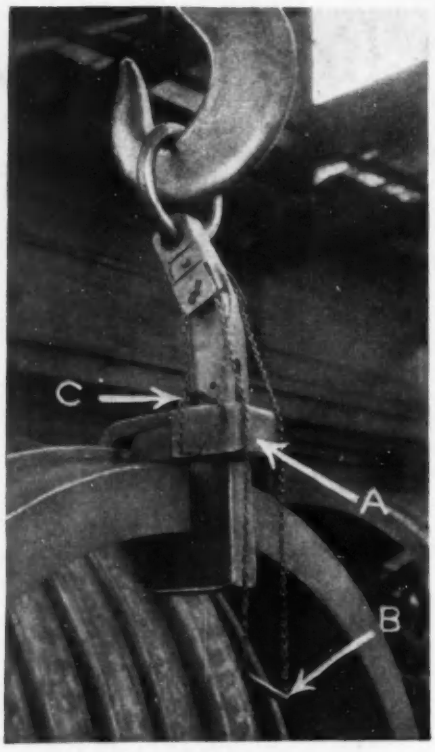


Fig. 4—Safety hook devised to transport wheel tires about the shop. Clamp bar A is locked in position by pin C in the hook shank

tire is gaged by adjusting sleeve *B*. When the final adjustment is made, the position of the index pointer is noted. Should it read 0.040 in., for instance, it indicates that shims 0.020 in. thick, or half the increase in diameter, must be placed between the tire and the wheel center in order to obtain the required shrink fit. Should the index pointer read zero or a few points beyond, no shimming would be necessary. If more than $\frac{1}{8}$-in. of shimming is found necessary, the wheel center is built up by welding, and re-turned, since thicker shims are not considered practical from a safety standpoint.

The tires are shrunk on with the aid of the gas-fired rings shown in Fig. 1. In this connection it is interesting to note the device, Fig. 4, used in handling the tires in the wheel shop. In essence it consists of a supplementary hook suspended from the regular crane hook. The particular feature is the hooked clamping bar *A*, which slides up and down the hook shank. Its vertical movement is controlled by the hand bar *B* by means of a pair of chains and pulleys. When the clamp bar is dropped into position by releasing the chain, it is securely locked by the insertion of pin *C* in the shank body. When so set, the device positively prevents the tire from slipping off the hook.

Rebuilding of wheel centers by welding was a long and expensive job until an old wheel lathe was modified to do the work automatically. Details of the modification are shown in Figs. 5 to 8. Fig. 5 shows the drive end with one of the automatic welding units mounted in position. The platform for the second unit, which at the time the photograph was taken was being used on another automatic welding unit close by can also be seen. It was necessary to gear down the main spindle so that it would make one revolution in 20 min. Welding wire $\frac{1}{4}$ in. in diameter is fed from an overhead reel as shown. The heads are advanced $\frac{1}{4}$ in. every revolution of the lathe spindle.

Two passes are necessary to complete the weld in two layers, totalling slightly less than $\frac{1}{4}$ in. in thickness. It takes about 20 hours to weld a pair of centers as against 74 by hand methods.

In Fig. 6 is shown a better view of the welding unit platforms, themselves of welded standard I-beams and plates. Fig. 7 shows how one of the columns for supporting the welding head platforms is carried in one of the regular tool posts on the lathe cross-slide and how it is supported at the rear. Bar *A* is $4\frac{1}{2}$ x 5 in. in cross-section and is securely fastened in the toolpost by two U-clamps. At its other end, it is welded directly to the column supporting the welding heads.

Channels *B* are bolted to the base of the cross-slide columns. They help support the slide *C* at the rear.

Fig. 5—Automatic welding head adapted to old wheel lathe to rebuild wheel centers. The spindle has been geared down to make one revolution in 20 minutes

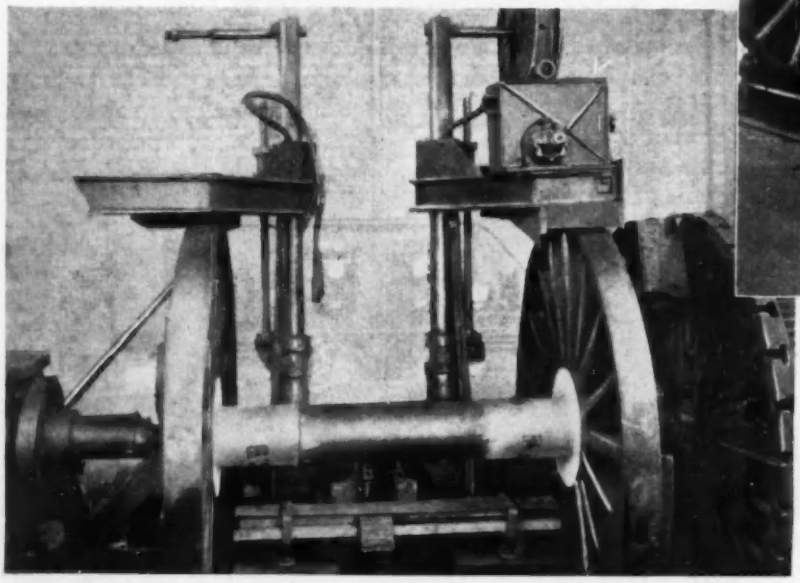


Fig. 6—Another view of the modified wheel lathe, showing the columns and support platforms for the automatic welding heads, only one of which is shown in position. Welded construction is featured in the change over

Bracket *E* is welded to the welder column also, and has a U-shaped connection to the slide *C*, which is babbitted to obtain an efficient bearing surface. Fig. 8 gives further details of this construction at the rear. In this view can also be seen eccentrics *A*, which have been added to the lathe and which actuate the longitudinal feed screws on the cross slides through ratchets and pawls.

The monetary savings obtained by the use of this automatic machine are noteworthy, as a comparison of the cost by hand and by machine shows. In both cases the wheel centers were turned down to about $67\frac{5}{8}$ in.

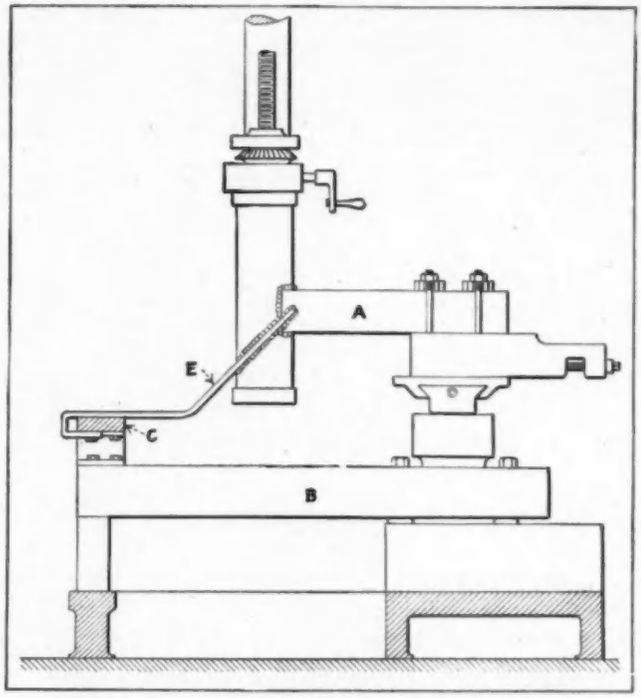


Fig. 7—Showing how the column supporting the welding head is carried in the tool post carriage in the front end and on a special slide bar at the rear

and were built up to 68 in., two layers of metal being deposited.

COST OF WELDING BY HAND

74 hours of labor @ $0.85 per hour	$62.90
150 lb. of welding wire @ $6.75 per 100 lb.	10.12
576 kw.-hr. electricity @ $0.01	5.76
33 per cent overhead on labor	20.75
2 " " " " material	0.32
Total cost	$99.85

COST OF WELDING BY MACHINE

20 hours of labor @ $0.85	$17.00
200 lb. of welding wire @ $8.25 per 100 lb.	16.50
180 kw.-hr. of electricity @ $0.01	1.80
33 per cent overhead on labor	5.61
2 " " " " material	0.36
Total cost	$41.27
Saving over hand method per pair of wheels	58.58

A better quality coated wire was used on the automatic machine, and this accounts for the difference in price in the two instances. More wire was used on the automatic

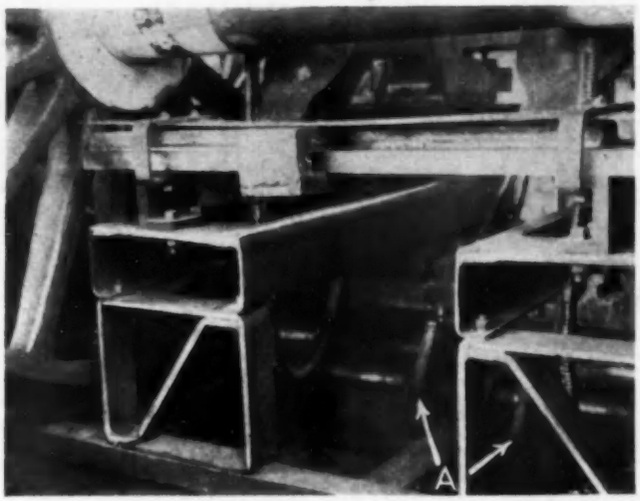


Fig. 8—Detail of the support of the rear slide for the welder columns. In this view can also be seen the eccentrics employed to drive the longitudinal feed screws on the tool post cross-slides

because a uniform thickness of deposit was made whereas in the hand job the thickness was varied to take account of eccentricity of the wheel center. With the present installation, it was found more practical to turn the wheel center to uniform diameter after the welding had been done rather than to turn it to a true circle first, weld it, and then turn the welded face to the final size desired.

Rim and spoke cracks, if present, are generally welded after the wheel center has been built up on the rim face. It should be noted that the rim is cut to relieve the strain of contraction of the spokes upon cooling and is then welded.

Standardized Specifications

BY HARRY KAUFMAN
Public Accountant

Standardized specifications should be prepared by purchasers so that all bids submitted are really comparable. In this manner open competitive bidding will be effected. Without definite specifications, the burden of proving that the lowest bid is really an inferior product which will not stand up or produce the product that the highest bidder guarantees, falls upon the higher bidder. As far as practicable, performance should be definitely written into the specifications.

To knock a competitor's product is the lowest form of salesmanship. It is just as unethical for the buyer to force the seller into this position as it is to force him to cut prices. With definite specifications, the inferior product is either forced out of competition, or the bid is made with reservations. If an inferior producer bids deliberately without reservation, common knowledge of the foremen and shop men will soon convince an overzealous purchasing agent that he is about to have something "pulled over" on him. There is, of course, the other side of the picture, which may also be evaded by definite, well-thought-out specifications, and that is in getting a product which is too elaborate and has too many unnecessary features for the particular purpose intended. These specifications do take time and money, but it is effort well expended for all concerned.

PROGRESS in Machine Shop Practice

By K. H. CONDIT

Editor, American Machinist; Executive Committee, Machine Shop Practice Division, A.S.M.E.

MEASURED by the advances in machine-tool design, the progress in machine shop practice during 1929 has been considerable. Since the greatest part of any possible advance in this art centers about the availability of improved production equipment, this particular measure is probably as significant as any that could be selected.

The second machine tool exposition held by the National Machine Tool Builders' Association served to introduce a record number of new pieces of machine shop equipment. This show took place in Cleveland early in the autumn and was attended by some 25,000 visitors, almost all of whom were the chief executives, operating heads, or specifying officials of machine-tool-using organizations. Many men of long experience in the industry expressed the conviction that never before had so many prominent men of the industry gathered in one place. And they were well repaid for coming, because they saw in operation something like 150 new machine tools, as well as many others that had been on the market for some little time but were still sufficiently recent in design to be far in advance of much of the equipment that is now in use.

The following statement, taken from the Show Number of *American Machinist*, outlines the more important developments:

"The substitution of automatic operation for hand operation on a number of the machines developed is a prominent factor featured in the equipment placed on exhibition. Wherever feasible, this improvement has been made. Such developments have demanded no little skill and ingenuity on the part of the machine designer and builder. Radical changes were required in most cases. The resulting equipment requires more care in set-up, more certain means of lubrication, and may involve a higher maintenance charge on account of the refinement of parts introduced. On the other hand, sturdiness has been added in most cases in developing or redesigning such types of equipment. Adjustments in its use, of course, must be made by skilled mechanics who are experienced in special machines, rather than by the ordinary machine operator. But to offset any increased initial cost and any added operating or maintenance expense, a vast increase in output has been brought about, making the unit cost of products manufactured only a fraction of what it was when former types of equipment were employed.

"The present tendency in machine design is rather away from the single-purpose machine. For high production and very special work, the single-purpose tool, of course, will always find a market. But its limitations when sudden and radical changes in the design of products come about are causing machine-tool builders to devote much less attention to this type of equipment, and more attention to the provision of special fixtures adapting standard tools to definite production jobs and to the design of unit-type equipment to be built up into various combinations suited to the requirements of different jobs. This tendency is most decided and undoubtedly will continue to be a major factor in machine design.

"Even in cases where machines have been developed for special purposes there have been introduced certain features which widen the uses of the equipment. For instance, a certain type of grinder designed for special railroad equipment work on a production basis has been adapted so that the machine can be used for tool grinding or for production grinding on other types of work.

"There is a definite tendency toward a more extensive use of hydraulic mechanisms on numerous types of machine tools. At the show, new applications of hydraulic feed to equipment such as lathes, grinders, smaller sizes of milling machines, multiple-spindle drills, honing machines, and broaching machines, were demonstrated.

"Further improvements in indexing have been made on machine tools placed on exhibition this year. One outstanding development is the application of the double Geneva motion on a work-rotating chucking machine.

INCREASING attention to lubrication is evidenced by the equipment developed during the past year. No definite tendency toward any one type of lubrication is to be discovered. Some manufacturers have adopted central, forced-feed systems for their equipment. Others prefer gravity feed from central reservoirs. Still others retain the oil-cups for individual bearings. Combinations of systems are also of frequent occurrence. For instance, the chucking machine above mentioned employs a central lubricating system for the main bearings of the machine, but a gravity-feed reservoir for the heavy turret, to avoid the use of slip joints which would be required if the main system were utilized for turret lubrication. One manufacturer is introducing a forced-feed lubricating system operated periodically under the control of an electric timing clock. Oil filters are also finding extensive use.

"Many other factors have become of increasing importance in machine design during the past year, and characterize practically all of the equipment placed on exhibition at the show. Among those factors which have received special consideration are: A higher degree of accuracy in the parts comprising machine tools and equipment, provisions for a higher degree of accuracy in the products turned out, ease and convenience of operation, reliability of service, compactness of design, decrease of floor space occupied, simplicity of drive, reduction of power consumption through the liberal use of ball and roller bearings, higher grades of steel and alloys for journals, spindles, gears, and other operating parts of

Abstract of a report presented at the annual meeting of the A.S.M.E., Dec. 2 to 6, 1929.

machines, convenience of inspection and cleaning, provisions for the removal of chips, facilities for mechanical handling, and the features of higher production, greater automaticity and adequate lubrication, which have been discussed above."

Further evidence of the ability of machine-tool builders to co-operate was given by the adoption of a standard color for machine tools. With very few exceptions, all machines exhibited at Cleveland were finished in this color, and the pleasing appearance of uniformity was sufficient justification for the move. Most of the builders who have adopted the standard color are making a small extra charge for finishing their products in special colors.

Because of the high rate at which machine-tool plants have been operating for the past year, the designing and building of the new models exhibited was attended by considerable difficulty. In fact, some of the innovations intended for Cleveland were not finished in time and will be announced later. This situation augers well.

THE facilities of the machine-tool building plants have also been increased during the year. Several new engineering buildings have been erected, and plant additions have been made to take care of greatly increased orders.

Undoubtedly, the most important single development of the year has been the progress made in adapting the new tungsten-carbide cutting tools to machine-tool uses. It must be admitted that many disappointments have accompanied the efforts to apply tungsten carbide but these were to be expected and on the whole there has been appreciable progress.

Unqualified success has attended the application of this material to the machining of rubber, fibre, and similar materials; and to the machining of brass, bronze, aluminum, and the like; also in most cases where cast iron has been the material to be cut.

It must be admitted that there has been considerable disappointment at the failure of this new cutting material to solve all the difficult machining problems of the shop, but it should be observed that much of this disappointment is entirely unjustified, and should not lead potential users to distrust its future possibilities. Too much was expected of a substance about which there was insufficient knowledge. When that knowledge has been obtained there is every reason to believe that tungsten carbide will do all that has been claimed for it.

A year ago, there was a general belief that tungsten carbide would bring about an immediate revolution in machine-tool design. This belief has not been realized. A few machines have been speeded up to meet the requirements of the new material, but at least some of the more recent designs have been found quite adequate to develop the full possibilities of it. Evidently the change in design is to be an evolution rather than a revolution.

An interesting effect of the introduction of tungsten carbide has been the improvement in high-speed steels. The threat of competition has driven the producers to extra efforts and the result has been that some of the current products show cutting ability as much as 25 per cent ahead of anything that has been available hitherto. Further advances are probable, especially because experience with tungsten carbide will accustom the user to the brittleness of a diamond-hard alloy, and will thus lead him to accept some lessening of the toughness of high-speed steel if it can be made harder. When the user will accept this situation, the maker of high-speed steel can develop steels which will have entirely new characteristics.

While the new cutting materials have occupied the center of the stage, developments of other new materials used in the machine shop have proceeded apace. Among the important ones is high-test cast iron, practically a new material. Cast iron of as high as 65,000 lb. per sq.in. tensile strength has been produced, and one foundry is consistently attaining strengths of 65,000 lb. Four processes are in use, all depending on the holding of the liquid iron at a high temperature, in the neighborhood of 3,000 deg. F., until the carbon has been dissolved, thus preventing the formation of the plates that weaken the structure of ordinary iron.

The research organizations of the aluminum, brass, and nickel companies have perfected many new alloys and improved older ones. Plastics have come very much into favor and are replacing metals in some instances. The so-called "stainless" steels have attracted considerable attention, and nitrided steels have found new uses.

All of these advances point to the need for more and better organized research work in the machine shop practice field. A little is being done by a few of the larger units but in the aggregate not much has been accomplished. From the very nature of machine shop work, and the absence of any shops of dominating size, the problem of how to organize research of the kind needed is difficult. Probably the only solution is a central institute or laboratory to be supported by contributions from the various trade associations and individuals in the industry, but before such an institution can be established, there must be an awakening to the true significance of fundamental and applied research. Much educational work lies ahead of any group undertaking to solve this particular problem, but the necessity is so great that it will justify large effort.

STANDARDIZATION in the machine shop practice field is in better shape than is research. Only one standard has been approved by the American Standards Association during 1929, that for toolholder shanks and toolpost openings, but the following are in type and are practically completed by the sectional committees: Spur gear tooth form, full depth system; inspection of gears; gear materials and blanks; taps, cut and ground threads; milling cutters; radial ball bearings; slotted-head screws; line work on drawings; and motor frame dimensions.

During 1929, some progress has been made in improving management methods and particularly cost methods. The outstanding example is the work of the National Machine Tool Builders' Association under the direction of its general manager and his staff cost consultant. Much progress has been made in getting uniformity of cost methods so that true comparisons are really possible.

Management throughout the industry has evidently accepted the soundness of the modernization principle. The greater part of the record business of 1929 has come from replacements of obsolete equipment rather than from plant enlargements. A certain amount of replacement business has had to be postponed by equipment builders because of their inability to make deliveries. The recession in the automobile industry, and the general slowing down that seems likely until the confidence shaken by the recent stock market gyrations has been restored, will give an opportunity for the builders to catch up on orders and put their full effort into campaigns to replace the vast quantity of obsolete equipment still in use.

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions given at the foot of the page have been arranged

New Drills and Old Men

"HELLO, Al. I hear you have ordered some of those new drills we saw at the convention."

"Yes, Williams okayed an order for a couple last week. How did you hear about it?"

"You must have told someone about it, because I heard some of your men discussing it last night in the bus going home."

"Yes, I told Bill Jackson about it. He didn't seem very enthusiastic, but I guess he will be all right when they come."

"I don't know about that, Al. Now that I'm not telling tales I don't mind saying that Bill was the one doing most of the orating, and he swears by all his household gods that he was not going to have his prices cut and his earnings reduced by any blankety-blanked drill press that couldn't be as good as the one he had now."

"Oh well, Bill likes to blow off; he knew you would tell me, and he was just asserting his independence."

"But, suppose he does refuse. What will you do, fire him?"

"I don't know yet. What would you do in such a case?"

"I'd tell him to hunt a new job pretty quick. That Bill Jackson is a stubborn cuss, and you can't reason with him as you can with some men. You'll have trouble with him."

"Oh, I don't know. I can run a blazer on Bill almost any time I want to."

"Yes, but how will you get him to use it. If he won't, you can't help firing him, can you?"

"I don't think it will come to that, Ed. Bill is a good drill press hand, and if he don't want to use the drills I am not going to force him hard enough to make him quit. I don't believe in this 'do it or quit' business. Still, I am going to use the drill presses when they come."

"Any reflections on any friend of yours, Al?"

"Not at all, old man. It just simply is not my way. It may be a weakness, if probably is, but still I prefer it."

"You know, old scout, there are two ways of starting a balky mule. One is to build a fire under him, and the other is to distract his attention so that he will forget his balkiness. It wouldn't do any good to build a fire under Bill."

"I've heard of that psychology stuff before. I've been told that the reason for spanking a kid when he cries is to change the current of his thoughts, but when I spank 'em, I spank 'em because I'm just plain mad, and it works just as well."

How can Al get Bill Jackson to use the new drill presses? Is the mental wear and tear greater on a diplomat than on a direct-actionist?

All foremen are urged to discuss these questions vital to their work; of course the dis

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DISCUSSION OF EARLIER TOPICS

Paying for Dependability

THE writer was apprenticed in 1874, and, though an old-timer, happens to be a modern mechanic. He holds a brief, all the time, for the man who can be depended upon. His opinion is emphatically that a man's value to his employer is in exact proportion to his dependability. Can it be otherwise? In every shop, with which I have been connected, as apprentice, improver, worker, and foreman, there have been men of far more productive value than the average, yet they all received the same rate of wage. In my long experience in the shops, I have known men who were fine fitters, turners, erectors, engine-smiths, and their rate, dependable men though they were, was as high as $7 per week. The salary for a superman, who could do all these things and a bit of drawing and designing as well, was the wondrous amount of $15 per week.

Why do employers pay a higher rate for a man who can be depended upon not only for mechanical ability, but for integrity? I have met such men, and I have also met their opposites. Employers do not pay these men their acknowledged worth because they are compelled to pay the majority of men more than they earn. That is the argument the employers use, and there is soundness in their argument.

I have "bossed" a shop of more than fifty men for over twenty-five years and have experienced the anomalous condition of having had men three times as valuable as others, yet all the difference between the pay of these dependable men and those who were just able to "dodge the sack," was, at the most, two cents an hour.

—J. T. TOWLSON, *London, England.*

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Should the Workman Share Responsibility?

WHETHER workmen shall be held responsible depends upon the understanding existing between the foreman and the men. If Ed's men are accustomed to using jigs and fixtures without a check-up of the first piece, then of course, the man did his duty and Ed was wrong in firing him, even if he did act up. If, on the other hand, there existed an understanding that the first piece of every lot should be checked up, then the man did not do his duty, regardless of the fact that it was the foreman who gave him the jig. Ed would be justified, in the latter case, in calling the man down, and if he acted up, as Ed says he did, he would have been justified in firing him. —H. F. FIELDER, *Foreman, New Era Manufacturing Company.*

A Bonus for the Ambitious

THE value of an education to a man in an industrial establishment cannot be over-estimated. The executive of a plant who purposely avoids promoting schemes for the mental improvement of those under him, because he fears for his own job, is a misfit. Nowadays, when education along any line is within reach of every man through the medium of correspondence schools or free night schools, to stand still is to be unworthy of advancement. I remember when foremen, and superintendents too, used driving methods for getting all that was possible out of human beings. Their actual knowledge outside of the work in hand was small. But it is different today. An up to the minute executive, whether he be foreman or general manager, is generally well read. I know many foremen who are consulted on important matters relating to design, development, and production methods. They, in turn, must have intelligent and capable assistants. And these assistants cannot be advanced to important positions, unless they study and persevere in an effort to grasp the technical side of their work.

Acting in the capacity of general foreman for a well known concern, I tried in vain to find an assistant who could be trusted with the responsibility of the work that came to our plant. Often I have sifted the personnel, only to find that I must go outside for a man, and invariably because the men available are not versed technically in the things that must be known.

—RAYMOND H. DAUTERICH, *Crescent Engineering Company.*

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Games at the Noon Hour

WHILE in Hamburg some years ago, I noticed that the dock workers had two hours "break" at noon. Thus, they were able to take a short nap and also play some simple games. I do not know whether this is still a practice, but it struck me as being very sensible and hygienic.

I have often thought, since the eight-hour day came into force, that it would have been wise to have made a longer mid-day break, such as mentioned above, rather than to start later or to finish earlier. Against this, I find that Ford's factory in Cork, Ireland, allows only half an hour for the midday lunch. Consequently, they finish earlier in the evening. Games at the noon hour in this factory would be impossible.

A lot has been written and said about industrial fatigue, and we are just waking up to the fact that the human machine requires attention, but we are not waking as rapidly as one could wish for. There is, in my opinion, a great deal for organized industry to learn about making the noon-day hour really refreshing and recreative.

—R. L. HASELGROVE, *Tool Mechanic, North Harrow, Midsex, England.*

I HAVE followed the machinist trade for ten years, and have noticed that it is customary for men to complain of being tired when they quit work at night. Surely, it is not the physical labor that has tired them, so it must be mental fatigue that causes the complaint. This complaint was prevalent among the men in our machine shop until another department challenged us to

discussion is not limited to foremen. Letters accepted and published will be paid for

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a game of baseball. We accepted, of course, and arranged for practice. We were all enthused. The older men seemed just as much so as the younger ones. We organized a team, and had our practice during the noon hour and sometimes after work in the evening.

Bill and Jim never complained of feeling tired any more. John brought out a suggestion for different set-ups, and we all became better acquainted. It was more fun to talk to one another, and, consequently, a more cordial feeling prevailed.

The nervous system needs stirring up, and exercise, whether physical or mental, usually provides this effect. Exercise at noon cuts the day in half, making the afternoon's production equal to the forenoon's and possibly greater. The army keeps its men fit by using setting-up exercises to break up the monotony of routine duty, and I venture to say that fifteen minutes setting-up exercises every day would increase production.

—HAROLD WEED, *Counterflo Heater Company.*

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Buying or Making Special Tools

TOGETHER with our precision machine, we generally have to furnish fixtures to help produce work held as close as 0.0003 in. We consider that nothing unusual, but these fixtures, made one at a time, would cost anywhere from $300 to $1,500. The high price would be the result of making one or two fixtures only, yet most of the component parts are no more accurate than the parts the fixtures themselves have to produce.

The majority of the parts for which these fixtures are used find their way into automobiles. Through their use we can buy first class automobiles, with all the fixings, for the price of a hand-made fixture with fewer parts than the automobile engine alone. One can imagine the cost of an automobile built in lots of one or two, each one different from the other. —J. C. BODE.

IN THIS advanced age of industry, specialization counts most of all, and the company which continually requires new tools for the work in hand, can do far better by purchasing their equipment through the competitive bidding method, than by making tools in its own shop.

The company, whose methods I am about to describe, is one of the largest in the country. The men in charge are specialists on various types of work, and their duty is to follow up and carry through those jobs, of which they have a complete understanding. When new tools are necessary, an engineer is sent to make a study of how the work can best be performed. When he has arrived at a conclusion he goes to the tool design department where his rough sketches are carefully gone over and necessary changes taken into consideration before the assembly view is drawn up.

If they decide against their own toolroom doing this work, letters are written to five or six selected concerns, asking for their quotations and best delivery dates.

Where special tools can be bought from an outside supplier at a lower price than we can make them ourselves, providing the delivery made is in accordance with our plans, we do not hesitate to pursue this course, for our toolroom can always be kept busy on other work. We never attempt to manufacture special tools that can be secured through the proper sources, for we are not tool manufacturers, and all of the floor space we can acquire can be used for productive purposes.

—F. A. J. SCHMIDT, *Industrial Engineer, Western Electric Company, Kearny Works.*

THE old-fashioned idea that "bought" tools are inferior to tools made in the company's own toolroom is rapidly disappearing. In price, appearance, and most important of all, in efficiency, the "home made" article suffers in comparison. I have seen cases where shop toolroom forces have been substantially reduced because the management found it cheaper to buy special tools outside. In my opinion, the excessive over-head incidental to using obsolete tool-room machinery was the deciding factor in these reductions. Even with up-to-date equipment, it is problematical whether the shop toolroom can "break even" as far as production costs are concerned. —ROBERT S. ALEXANDER.

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THE · NEXT · TOPIC

"Too Much Co-operation"

Buying or Making Special Tools

SUMMARY OF THE DISCUSSION

Williams adopted the policy of having special tools and simple fixtures made outside the shop when they could be bought more cheaply than the toolroom could make them. Ed seemed to think that the practice would eventually eliminate toolmakers. Al, on the other hand, contended that it was good business, because a firm that specialized on such tools could produce better tools.

IT WAS somewhat of a surprise to find that all the shop executives and staff members who took part in the discussion were emphatically in favor of purchasing special tools when they could be bought to advantage.

Some companies make a regular practice of having their own toolroom bid against outside firms. One company, a very large one, justifies this practice on the ground that it can utilize the floor space necessary to manufacture special tools to more advantage for production purposes.

One correspondent described the practice of purchasing special tools as one of the manifestations of the trend towards specialization in industry, a logical result of the application of the principle of the division of labor. Another points out that a fixture for milling a small part for an automobile engine, itself no more accurate than the part it was made to produce, costs more than an entire new automobile.

There are things to be said on the other side, of course, and the opinion was advanced that possibly the best practice would be to purchase the simpler tools and build the more complex ones from standard parts when possible.

Dual and Multiple Tooling

To increase production by improving the tooling equipment of machines is the aim of all plants, large or small

By F. H. Mayoh
Designing Engineer, Package Machinery Company

THE USE of dual and multiple tool-equipment wherever it is practical to have one operator handle the work is economical practice. Through the use of special machines and fixtures, this practice is almost universal in mass production, but the smaller plant either cannot afford such equipment, or the size of the manufacturing lots do not justify its purchase.

The small plant, however, can reduce its manufacturing cost by adapting and arranging much of its present machinery so that loading time is reduced, or the capacity of the machine is increased.

The three-way, horizontal drill with fixed-center drills, is not shown as an example of what can be done in this respect, but to provide a contrast to drilling by the usual method. It also shows how far the practice may be carried. This set-up is a good example of the work done on drilling machines—they can no longer be called drill presses.

Here the work is held in a suitable fixture while groups of drills in the heads, at each side and at the rear, drill holes in three sides of the work.

The broaching machine is a type that lends itself readily to dual production. In this machine, a screw engaging a nut in the revolving spindle causes the head *A* to be traversed lengthwise of the machine in either direction, as indicated by the double-pointed arrow. The usual practice is to have the head travel to the right

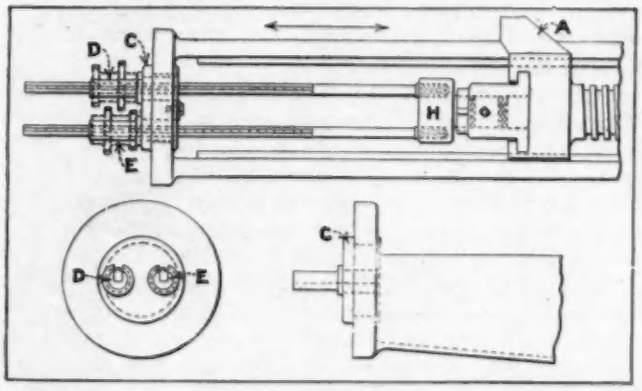


Fig. 2—The capacity of the machine is increased by the holder H attached to the head A. The fixture C holds two cluster gears D and E, which are broached simultaneously

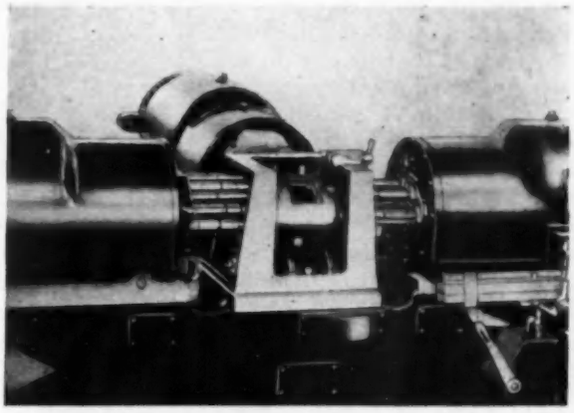


Fig. 1—Three-way drilling machine. The work is drilled on three sides by drills held in multi-spindle heads, completing the job in one operation

at a suitable cutting speed for broaching, and to have it travel to the left quickly to return the broaches to the original starting point. The bed of the machine has suitable guides on which the head travels. In the circular-end portion of the bed is an opening in which may be placed a suitable bushing or fixture to hold the work.

It is customary, where a single spindle broach is used, to broach one part at a time, unless their shapes allow of two or more being cut in tandem. In the illustration, two cluster gears are shown mounted side by side on separate supports. The two broaches are attached to a holder which is in turn attached to the sliding head by means of a connection that aligns the broaches with the supports. With the head at the extreme left-hand end of the machine, the work may be slipped over the broaches in the usual way. The action of the broach draws the part against the fixture, and also centers it.

A different type of work, where two broaches are also caused to function, is shown in Fig. 3. The general arrangement of the machine is the same as that shown in the previous example, except that the faceplate end of the machine carries a fixture for holding work of an irregular shape. Two rectangular broaches operate through the fixture and broach slots in the work, which is located on a pin. When the work is tightened against the faceplate, the two projecting ends square it up by its previously-finished surface, since the work is free to pivot upon the locating pin. With the broaches at the extreme left-hand position in the machine, the work can be slipped into place. Both slots are broached at one pass. During the cutting, the broaches are backed

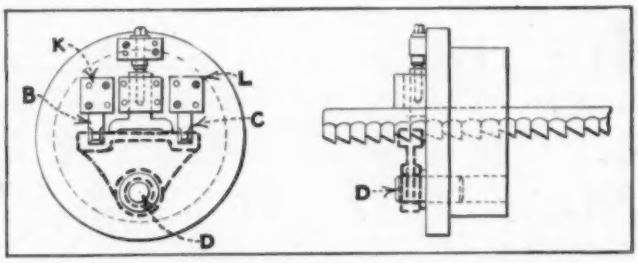


Fig. 3—Two rectangular broaches B and C slot the work, which is located on a pin D. The broaches are backed up by hardened blocks K and L. Clamping is not necessary

up by hardened blocks at points directly opposite the cutting edges. The blocks take the thrust of cutting, and the entire arrangement makes a compact and rapid device for holding the work while the broaching is done. No clamping of the work is necessary.

Illustrated in Fig. 4 are suggestions for saving time in the operations of boring and turning. A gear blank is held in the chuck of a boring mill equipped with two heads. The outside of the hub is being turned by the tool held in the bar at the left, the slide being fed downward, as indicated by the arrow. At the same time, the tool held in the bar at the right is turning the inside of the rim. The slide is set at an angle, so that the inside of the rim will be tapered the desired amount. This job indicates one of the advantages in the use of a boring mill equipped with two heads.

In the lower view is a diagram of two small boring mills on one base. There are two heads and two tables, each table being equipped with a chuck. The heads and the tables on both parts of the machine can be operated independently. The operation shown is the core drilling of two similar parts, the core drills being held in slides that are in alignment with the table spindles.

In using such a machine with the set-up, the operator loads one chuck and starts one part of the machine. While one part is being machined, he loads the other chuck and starts the other part of the machine. The operation is almost continuous.

In milling a large batch of like parts, production can be greatly increased by the use of duplicate fixtures mounted on an indexing base. In using such a device, the work is mounted in one fixture and the table carrying the indexing base is started. While cutting is taking place, the operator loads the other fixture. At the completion of the cut on the work in the first fixture, he runs the table back to the starting point, indexes the fixture, and proceeds to mill the work in the second fixture. The principles employed in such an arrangement are shown in Figs. 5 and 6. In the machine shown in Fig. 5, the usual type is replaced by one with a top inclined toward the front of the machine and on which is mounted an auxiliary, revolvable table. The auxiliary table is pivoted in the usual way and can be clamped in either the position shown, or at 180 deg thereto.

The top of the auxiliary table is inclined at each side of the center, each inclination being at the same angle as that of the main table. The result is that, when mounted on the main table, one surface of the auxiliary table is level, while the other surface is inclined toward the front, the angle of inclination being double that of the main table.

In using a machine of this type, duplicate fixtures are mounted on the auxiliary table, one on each angular face. The fixture on the inclined part of the table can be loaded while the work in the fixture on the level part is being milled. At the end of the cut, the auxiliary table is indexed through 180 deg., reversing the positions of the level and the inclined portions. The inclined

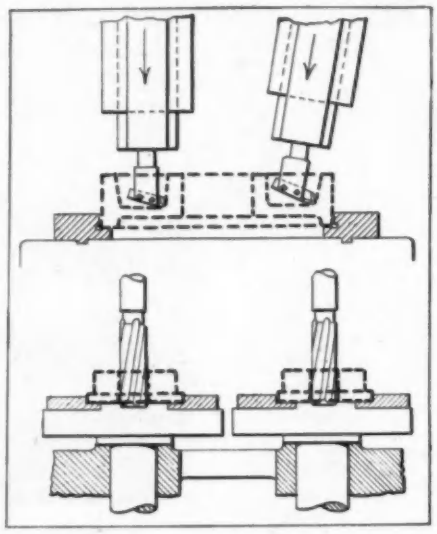
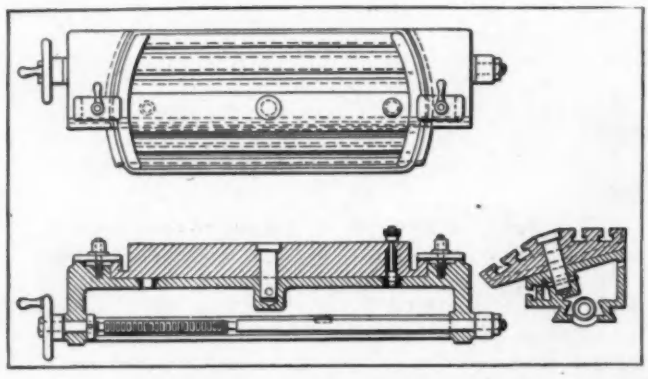


Fig. 4—In the upper view, two operations are being performed at once. In the lower view, two similar parts are being core drilled

Fig. 5—A rotating table with two inclined work faces is mounted upon the regular table of a milling machine



loading surface facilitates both loading the fixture and removing the chips. The operator can see directly into the fixture, and the loading is being done on a lower plane than that occupied by the other fixture; besides, the loading fixture is away from the cutters and has more room under the overarm.

A better understanding of this arrangement will be had from Fig. 6 wherein the fixture *A* is mounted on the level surface of the auxiliary table, while fixture *B* is mounted on the inclined surface. Milling takes place on the work in fixture *A* while the operator is loading fixture *B*. After the cut has been completed on the work in one fixture, the auxiliary table is indexed 180 deg. about its central stud. The work is located on the hardened seats, and two clamps hold it securely against the pressure of the cut. It will be noticed that the front of the fixture is open so that the accumulation of chips can be brushed off in that direction.

An arrangement for disk grinding the sides or ends of work by the use of two grinding wheels, is shown

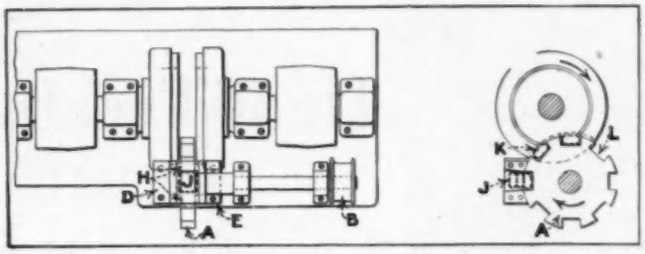


Fig. 7—The feed disk A contains eight pockets L and is caused to revolve by the pulley D. Guides D and E locate the work J sidewise, and a band K prevents it leaving the disk until it has been ground

in Fig. 7. The abrasive blocks forming the grinding wheels are held in suitable chucks, and the wheels are mounted on spindles driven by belts from a countershaft above. The feed disk, in which there are eight pockets, is caused to revolve slowly by a belt. Guides locate the work sidewise, and spacing blocks between the side guides also form a part of the arrangement. Each pocket in the feeding disk picks up a part as it passes by the guide blocks and carries it between the grinding wheels where the rough ends are ground to the finished size. Between the grinding wheels, and around part of the feeding disk, is a guide which prevents the work from getting out of position until after it has been ground. As the feeding disk revolves, the work is carried around until it drops from the pocket into a box below. The operation is rapid and presents an example of two grinding wheels working to advantage.

Even in gaging, more than one measuring spindle can often be used to advantage in the same instrument. The illustration shows four ways of using a micrometer with two spindles, the principal idea being to take two measurements on the work without moving the measuring spindles more than a small amount. The view in the upper left-hand corner shows a micrometer in which the outer spindle is set to gage the large diameter of a plus and minus size on a round part, while the inner spindle is set to gage the smallest permissible diameter on the same part. The micrometer is thus converted into

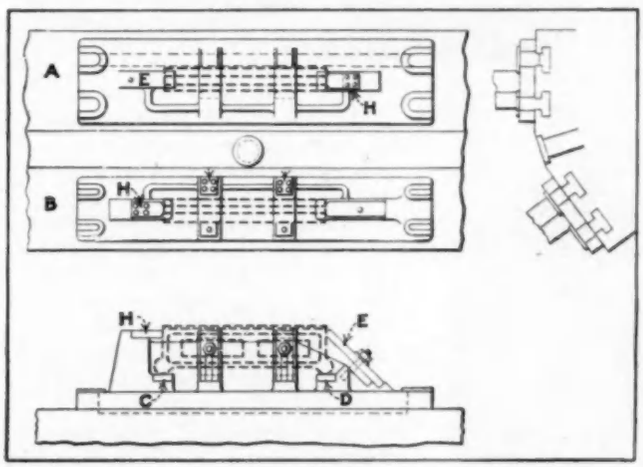


Fig. 6—Fixtures mounted on the inclined working faces of the rotating table. The work is located against H, the stops C and D and the clamp E forcing it against the end stop

what is virtually a "go" and "not go" gage. Both spindles are locked at the sizes required, by separate locknuts. The application shown in the upper right-hand corner is to measure the distance X across two

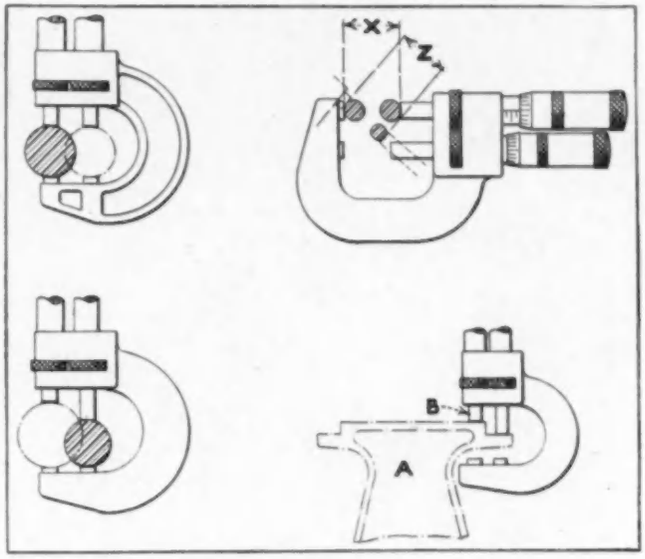


Fig. 8—Double spindle micrometer saves time in inspecting work where gages are not justified or available

pins, using the outer spindle. The micrometer is then transferred to a position where the distance Z can be measured with the inner spindle. The three pins are mounted in a plate, and the advantage of using a micrometer having two spindles is that the spindles do not have to be adjusted from one size to the other.

In the lower left-hand corner is shown a micrometer being used as a snap gage for gaging two diameters on the same piece. The outer spindle gages the larger diameter, while the smaller diameter is gaged by the inner spindle. Here again the advantage is that both spindles can be locked and the micrometer used as a snap gage for two measurements.

Another use to which a micrometer having two spindles can be put, but one where it is necessary to use extreme care in taking the measurement and to do a little figuring, is shown in the lower right-hand corner. The two spindles in this case are being used as a step gage. The inner spindle is held in contact with the lower surface of the work, while the outer spindle is adjusted until it will just touch the upper surface, care being taken that the micrometer is held squarely. Subtracting the reading of one spindle from that of the other will give the height of the step. The anvils do not touch.

While it would not be feasible to illustrate the great variety of parts that lend themselves to the application of dual and multiple tooling and gaging, the foregoing illustrations show, in a general way, lines along which such developments may lead.

PRODUCING successful oxyacetylene welds in nickel requires the use of a flame with a slight excess of acetylene, for an excess-oxygen flame will produce a heavy film of oxide. The envelope of the flame should cover the weld during the whole operation to keep the molten metal from being exposed to the air with consequent oxidation. The welding head or tip used for welding nickel should be, in general, one size larger than the ones used with the corresponding gages of steel. The finished weld should also be reinforced sufficiently to allow for grinding, which will remove the coating of black oxide on the surface.

Heat-Treatmen a

Practice in M

Caterpillar T

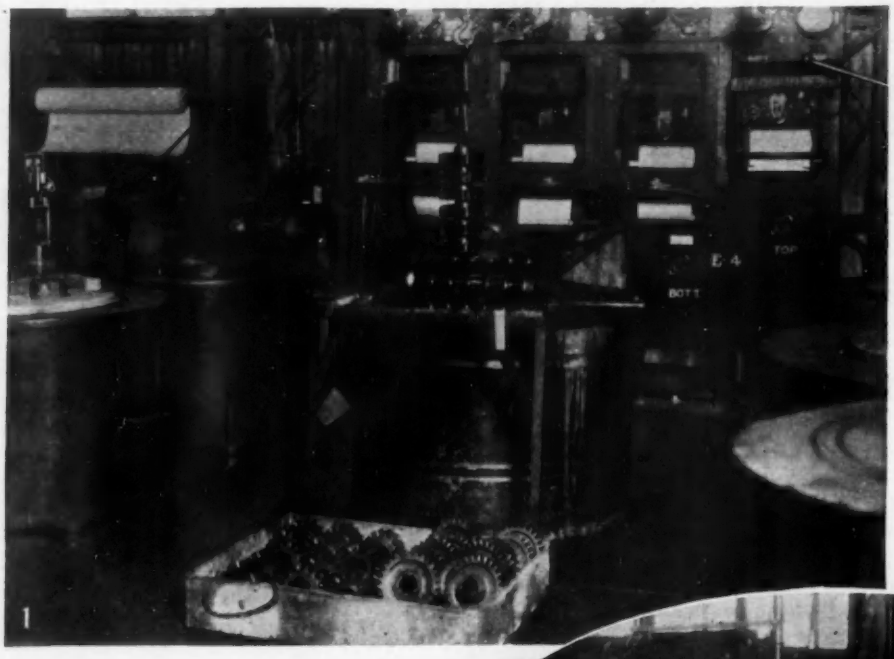


Fig. 1—Parts of tractors must be heat-treated to resist wear and shocks. Here is a battery of "hump" furnaces for heat-treating transmission parts, such as gears and shafts. The temperature of each furnace is controlled by an individual instrument to insure uniform results

Fig. 2 — After transmission gears have been hardened they are drawn in "homo" type furnaces. The work is placed in a steel container, and the charge is placed in the furnace by an air hoist. Individual heat-recording instruments are used to check the temperatures. The equipment is placed close to the hardening furnaces

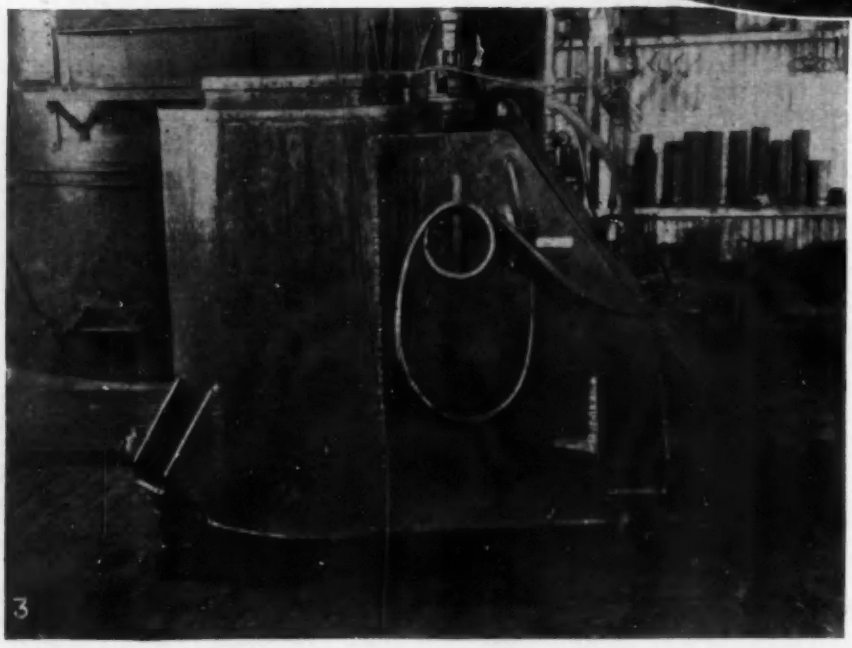


Fig. 3—In dividing up the work for the various furnaces, there are times when a single unit must be used for quenching, either with oil or water. To meet such cases, the portable, oil-quenching unit shown has been built

and Inspection

Manufacturing

Tractor Parts

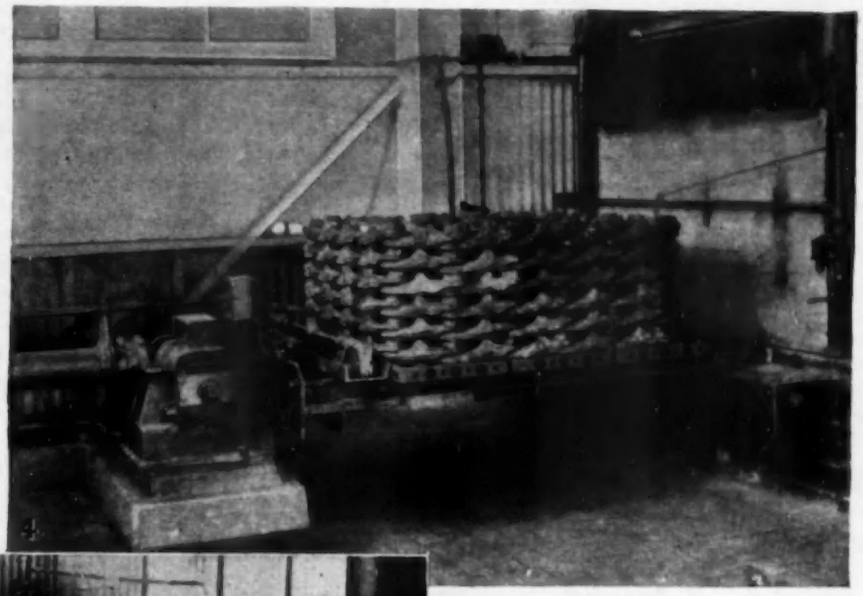


Fig. 4 — View of a normalizing furnace, showing the charging end. The links weigh about 11 lb. each, and a maximum charge of 3,600 lb. can be accommodated. The pusher is operated by an electric motor through speed-reduction mechanism. The temperature is controlled automatically by electric regulators

Fig. 5—A rotary furnace for heating links for hardening. The hardening temperature is from 1,460 to 1,480 deg. F., and is reached in 40 min., or in one revolution of the furnace bed. The links are drawn in a continuous-type "pusher" furnace at 840 deg. F. in approximately ½ hour

Fig. 6 — Heat-treating is supervised by the metallurgical department. The laboratory is equipped with many forms of testing machines, and additional hardness-testing devices are conveniently placed in the heat-treating department. The hardness of a drive gear is being tested in the machine shown

Photographs by courtesy of the Caterpillar Tractor Company

IDEAS FROM PRACTICAL MEN

The department, "IDEAS FROM PRACTICAL MEN," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit.

Magazine Feed for a Punch Press

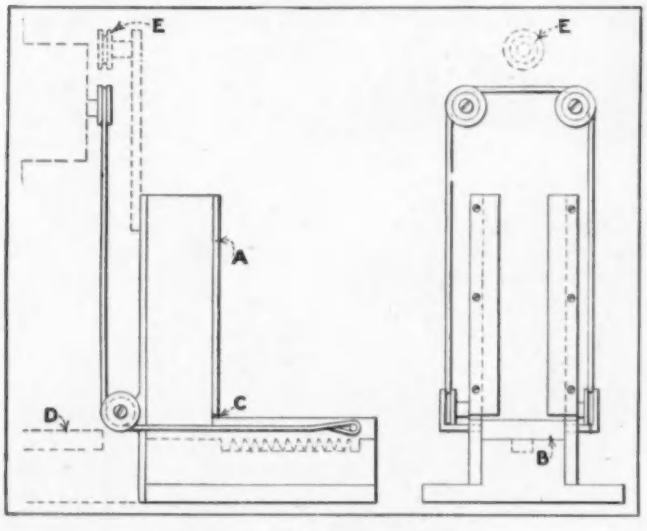
BY A. R. KLING
Chief Tool Designer,
Plainfield Manufacturing Company

A SIMPLE and direct method of feeding disks to a drawing die is shown in the illustration. Disks are stacked in the magazine *A*, which is attached to the bolster plate in front of the die. Feeding is accomplished by means of the slide *B*, the front of which is stepped so as to permit the bottom disk to drop in front of the shoulder *C*. The slide is confined between guide plates. A cable, attached by studs on both sides of the slide, passes over pulleys at the base of the magazine, thence upward and over pulleys attached by studs to the press ram.

As the ram moves upward, the cable is pulled, drawing the slide forward and pushing the bottom disk from under the stack, through guides *D* onto the die. On the downward stroke of the ram, the slide is returned to its original position by a spring, and the bottom disk in the magazine falls into feeding position.

When the stroke of the press is greater than the diameter of the disks to be fed, the studs to which the cable is attached can be moved forward to other holes in the slide, permitting it to go farther back when the ram is down, and thus preventing the slide from pushing a disk forward until the ram rises an appreciable amount.

In cases where the diameter of the disks is greater than the stroke of the press, an intermediate pulley can be attached by a plate to the magazine, as at *E*. As the ram nears its highest position, the part of the cable between the pulleys attached to it will strike the pulley *E*, thus giving an additional amount of pull to the cable and giving an additional amount of motion to the slide. The amount of this increased motion can be controlled by moving the pulley *E* farther up or down in relation to the topmost position of the ram.



Automatic feed for a press

Double Fixtures for Milling Plier Parts

BY H. C. FRANCIS

LOWERED costs by mass production should perhaps be credited as much to work-holding fixtures as to the machines on which the work is done. Two good examples of fixtures for making parts that go into products selling at low prices are shown. Both are from the plant of the Willam Schollhorn Company New Haven, Conn. In Fig. 1 is a double fixture for milling plier jaws, formed milling cutters giving the desired outline. Similar parts are milled in both fixtures. The large handles operate quick-acting clamps so that little time is lost in loading and unloading the work. The handles work in opposite directions.

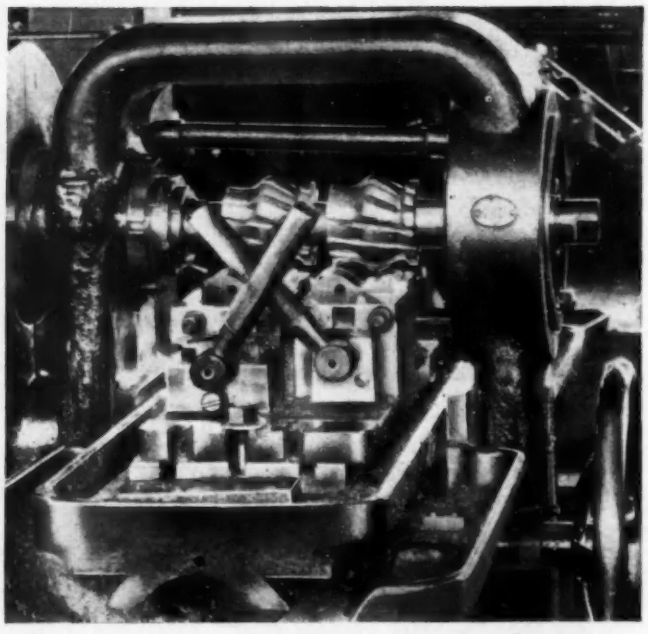


Fig. 1—Double fixture with quick acting clamps for holding plier jaws

The work shown in Fig. 2 is more difficult, because the handles must be clamped by their curved surfaces. This is also a double fixture, one side being open to show how the pieces are supported. The holes in the handle

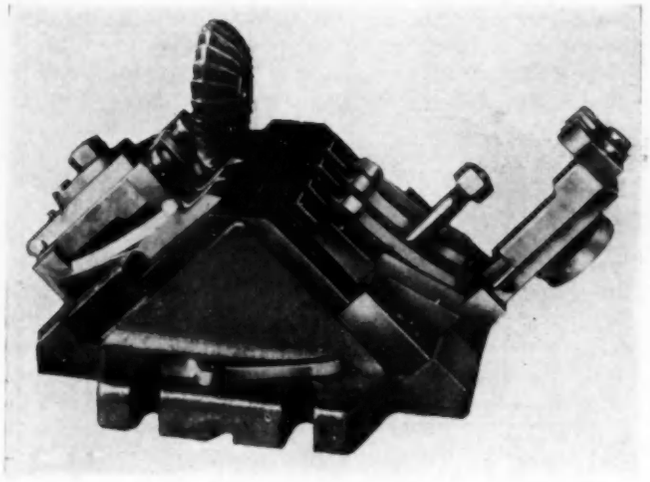


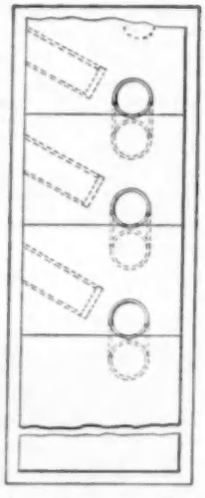
Fig. 2—Equalizing jaws on a double fixture for clamping curved plier handles

are utilized in locating the piece by pins in the fixture, while the heavy clamp holds them firmly during the milling operation. Each clamp carries two equalizing jaws, so that each piece is clamped rigidly in spite of any slight irregularities that occur. Each jaw clamps two pieces. A piece is shown on the front of the fixture and a formed cutter at the top.

Depth Gage for Measuring Liquids

By Elton Sterritt

The customary method of determining the liquid contents of a tank is to lower a graduated stick through a vent, read off the depth as indicated by the height of the moisture on the stick, and find the contents through a chart or table in which the capacity has been computed for each increment in depth of the tank in question. Where the liquid is volatile, such as gasoline or ether, and tends to evaporate before an accurate determination can be made of the line of demarcation between the wet and dry area, a more accurate means of measuring is required.



Gage for measuring the depth of liquids in tanks

The measuring may be accomplished by taking the usual 1-in. stick and drilling a series of holes ½ in. apart, and inclined downward at an angle of 30 deg. as shown in the illustration. By drilling a second series of holes on an adjoining face, a graduation of ¼ in. may be obtained. To prevent the wood from absorbing the liquid, a 22-caliber cartridge shell should be forced into each drilled hole and afterwards sawed off flush, with a fine-toothed hacksaw. It is advisable to shellac the outside of the shells before forcing them into place, afterwards shellacking the whole stick.

The lower lip of the shell is the line of measurement and when the stick is let down into the tank, the shells will fill, as far up as the level of the liquid. If the stick is dropped into the tank, the splash does not fill the shells above the level of the surface, the splash being outward.

Holder for Knurling and Cut-Off Tools

By Jack Ferris

Foreman, Automatic Machine Department
Coleman Lamp and Stove Company

Having to make a large quantity of parts such as the one shown in Fig. 1, and wishing to do the knurling without an extra operation, we designed a combination holder for the knurling and cut-off tools.

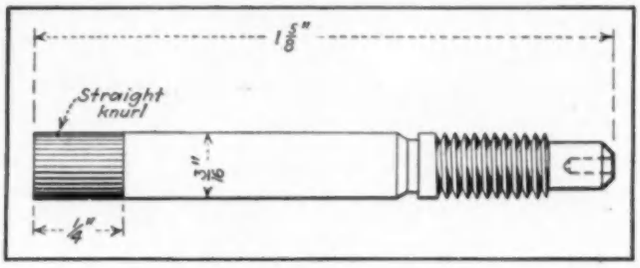


Fig. 1—The piece to be knurled

The combination toolholder is shown in Fig. 2. It is smilar to the regular Brown & Sharpe holder for circular forming tools, with the exception that it has a double knurl-holder built on the front end. It is used on the cross-slide block of an automatic screw machine, making possible the knurling and cutting off of the parts with the tools on one part of the cross-slide, thus saving an extra operation. Parts of small diameter can be knurled withqut bending the stock, and without the use of a steadyrest. Consequently, no smooth places on the work will be marred.

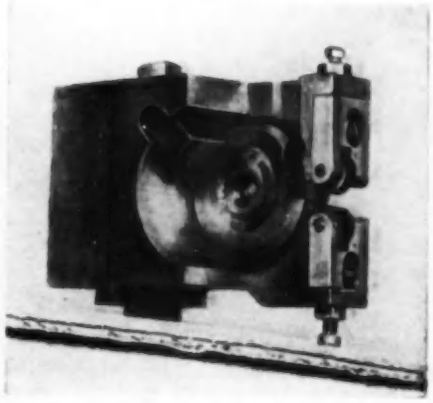


Fig. 3—Combination holder for knurling and cut-off tools

Preventing Breakage of Small Taps
Discussion

By R. H. Kasper

In an article under the title given above, on page 1020, Vol. 70, of the *American Machinist*, Wm. S. Rowell gives a method of eliminating tap breakage by reducing the outside diameter of the first tap, and completing the work with a tap of full size. My experience in tapping high-carbon and high-chromium steels in this manner has proved to be unsatisfactory, the second tap breaking more frequently than if the tapping were done in one operation.

At first, the toughness of the steel was supposed to be the only reason for the difficulty, but a close examination revealed the real cause. When the outside of a V-thread tap is ground down to the pitch diameter, the width of the lands increases considerably, so that the thread cut in the hole will be flat at the bottom. When

the second, or finishing, tap is started in the hole, it does not always follow in the path of the first tap, so that it is possible for the second tap to crowd to one side of the partially-cut thread, the condition becoming more pronounced as the length of the thread increases.

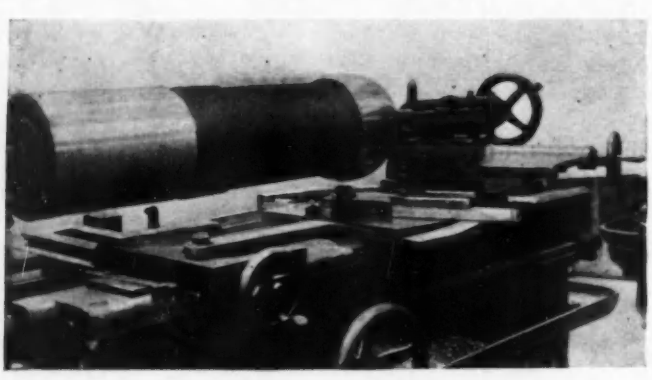
I have found that the best method is to have the first tap undersize in all dimensions, while still retaining the standard thread-shape. Then, when the second tap is passed through, there is a natural path to guide it. Tap manufacturers are now marketing such taps, which can be had in a series of two or three.

Attachment for Turning Spherical Surfaces

By Franz Bermann

Supt., St. E. G. Locomotive Plant, Vienna, Austria

Two or three years ago, I read an article in the *American Machinist* by C. F. Henley, in which he described and illustrated an attachment for the lathe for the rough turning and accurate finishing of spherical surfaces.



Attachment for turning spherical surfaces

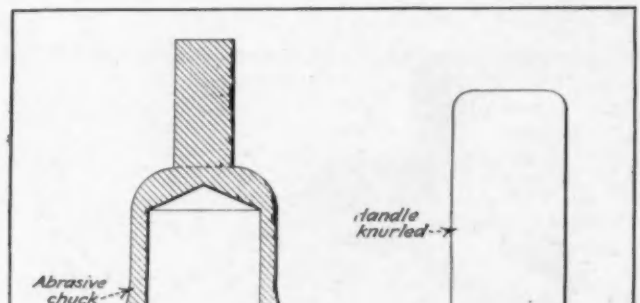
Since we had to turn the spherical ends of steam pipes for locomotives of the Mallet type, I thought the attachment would be a good one for our use. Accordingly, I had our tool shop build one. The cost was remarkably small, and the attachment has been used with excellent success. The illustration shows it in place on the lathe.

The pipes are made of bronze, and the spherical parts are 10 in. in diameter. We run them at 40 r.p.m. with a feed of 0.01 in. The depth of the roughing cut is 0.2 in. and that of the finishing cut is 0.04 in. No vibration is noticeable, and we get smooth and accurate results. No special training is necessary for the operation of the device, and any of the apprentices can produce good work by its use. I would be very glad if Mr. Henley should read this article, as we are very grateful to him for the suggestion of the device.

Tool for Buffing Rubber Disks of Emergency Valves

By John C. Grover

In putting new rubber disks on the stems of emergency triple-valves, the disks are often out of square with the stems, so that it is necessary to buff, or grind, the disks with abrasive cloth to bring them square to prevent leakage. For this purpose, the tools shown in the illustration were made in the shops of one of the large mid-west railroads.



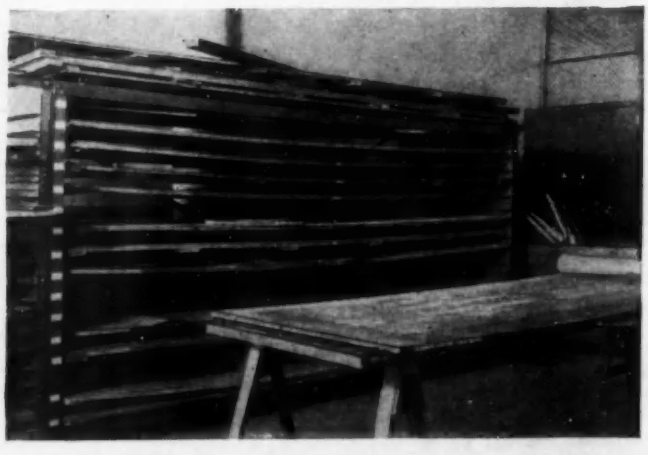
Buffing tool, holder for valve stem, and die for cutting abrasive cloth

At *A* is a chuck for holding the abrasive cloth, the central hole being of a diameter to fit the button on the valve stem. At *B* is a fixture for holding the valve stem and at *C* is a stamping die for cutting the round pieces of abrasive cloth to fit the chuck. The buffing is done in a drill press.

Storage Racks for Layout Boards

By O. J. Franklin

In a large plant, such as that of the Studebaker Corporation at South Bend, Ind., where the floor space covers 151 acres, and where changes in machinery layout are constantly going on in one part of the plant or an-



Method of "filing" layout boards on which machine cutouts are mounted

other, it becomes quite important to keep an up-to-date record of the plant layout. The idea of using cardboard cutouts scaled to represent the floor space occupied by a machine is not new, but if the boards representing each shop or building were kept permanently mounted and in view, they would occupy considerable space. To get around this objection, Studebaker engineers designed portable boards about 12 ft. long by 4 ft. wide with six battens or cross pieces underneath for stiffness. These boards are "filed" on special shelves or storage racks, as can be seen in the illustration.

There are three of these "file cabinets" made up of angle-iron pieces bolted together, and each set holds sixteen boards. Each board is identified by an embossed aluminum name plate along the outside edge at the left end, and when required for observation or alteration, is pulled out and placed on three ordinary carpenter's horses. A sheet of wrapping paper is used to protect the boards from dust. It can be rolled back out of the way when the board is in use.

Each board is covered with a heavy, buff, drawing paper upon which the building floor plan is laid out to the scale of $\frac{1}{4}$ in. to the foot. Machine cutouts to the same scale are tacked in position on this floor plan. Tracings can be made of the layout and filed for permanent record before any subsequent changes in layout are made. Contemplated changes can be vizualized by shifting the cardboard machine cutouts about on the floor plan in the usual way.

Jacking in Valve Liners

By Frank J. Oliver, Jr.

For some time it was the practice at the Chicago shops of the Chicago & North Western Railroad to pull a valve liner into place by screwing up a large nut on a tie bar connected to the liner by a plate through which it passed.

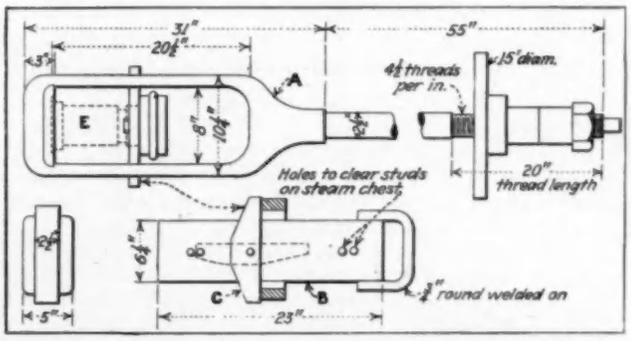


Fig. 1—Yoke designed for use in jacking valve liners into place

But this was a slow process. Later it was decided to jack the liners into position by means of the special yoke shown in Fig. 1. This resulted in cutting down the time of the operation considerably. In Fig. 2, the device is shown in use on a locomotive.

In operation, yoke *A* is run through the valve liner and through the steam chest until the disk, 15 in. in diameter, engages the end of the liner. Cross bar *B*, suspended from a crane hoist, is then dropped through the opening in the yoke, and the pivoted link *C*, heretofore in a vertical position parallel with the crossbar,is swung at right angles to it so that the sides of the yoke rest upon and are supported by it. Holes are provided in the crossbar

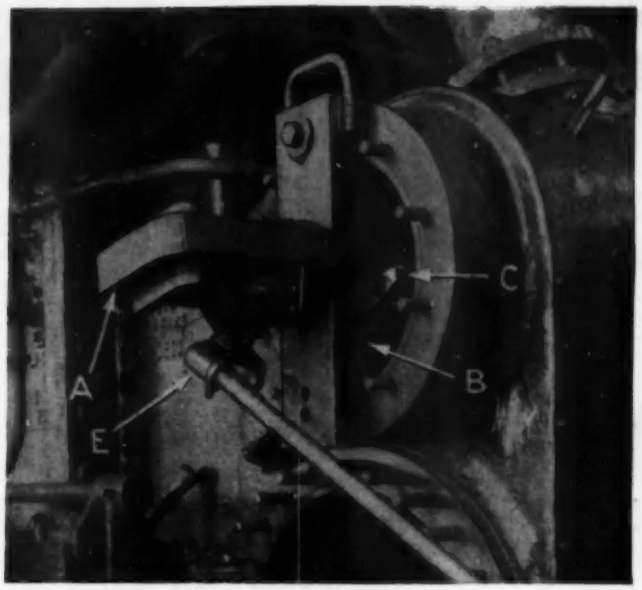


Fig. 2—The device in operation on a locomotive

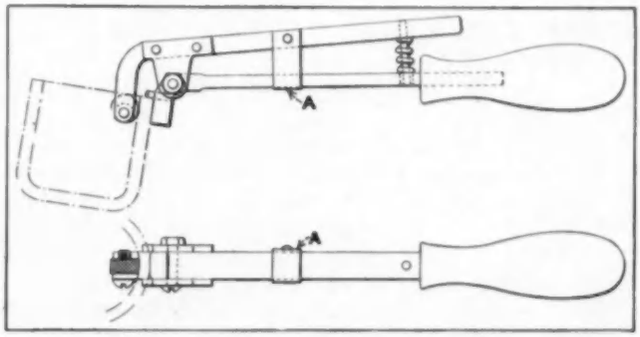
to clear the studs in the steam-chest end, and one of the protruding studs is used to clamp the crossbar in position. The 50-ton hydraulic jack *E* is placed between the yoke end and the crossbar. A plate 5 in. wide is welded to the yoke to act as a base for the jack. It is recessed $\frac{1}{4}$ in. for this purpose. The nut at the end of the yoke arm is used only for initial adjustment of the device, and is not touched during the actual jacking operation.

The entire yoke was cut out of a $2\frac{1}{2}$-in. plate with an oxyacetylene cutting torch, using a templet for guiding, and the shank was forged round from the square section. Welding was used for placing the support base for the jack in the end of the yoke, and also for tacking the handle to the crossbar. This latter is made from $\frac{3}{4}$-in. round stock.

Safety Device for Handling Press Work

By B. J. Stern

In the illustration is shown a device for handling drawn-steel cups for a second drawing operation. The cups must be placed in a nest in the second-operation die, ordinarily bringing the operator's hand directly under the



Tongs for handling press work

punch where it is likely to be injured through the accidental tripping of the press. To obviate such danger, the device shown was made for handling the cups.

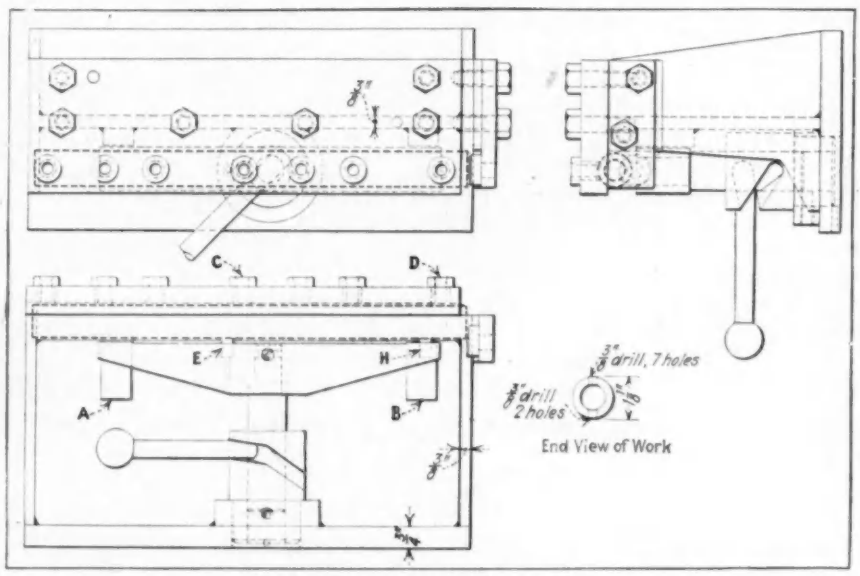
In operation, the cups are gripped near their tops

between a knurled roller in one jaw and a knurled surface in the other jaw, the jaws being pivoted and forced toward each other by the pressure of a spring. While the knurled roller is pivoted eccentrically, it does not revolve, but is locked in one position by the screw upon which it is mounted. The eccentric mounting is merely for adjustment to work of various thicknesses, as the amount the jaws can close is limited by the piece *A*. Depressing the upper member opens the jaws, while releasing the pressure upon it allows them to close upon the work by the pressure of the spring. Thus work can be picked up, transferred to the nest, and released without the operator's hand being brought under the punch.

Drill Jig Built Up by Welding

By George H. Feltner

Welded jigs and fixtures can be made more quickly and at less cost than if made from castings. Sometimes the saving in cost is not so important as getting them in use in the shortest time possible. The latter case was the deciding factor in the method adopted in making the jig shown in the illustration. If the jig body were to be made from a casting, at least three days would be required to make the pattern and get the casting out of the foundry. By fabricating the jig from steel plates it was in service in less than two days after ordering.



Welded fixture for drilling a shaft

The body of the jig was made by welding steel plates together, as shown. Two guides for the clamp, at *A* and *B*, were welded to the central web, and a disk having a thickness of 1 in. was welded to the base plate. The only machine work required was boring a $2\frac{1}{4}$-in. hole through the disk and the base plate to receive the cam assembly, and drilling and tapping the necessary holes for attaching the bushing plate and the end stop.

The jig is used for drilling nine $\frac{3}{8}$-in. holes in hollow rocker shafts. Two holes are drilled in one side of each shaft and seven holes in the other side, the two rows of holes being lengthwise of the shaft and diametrically opposite each other.

First, the two holes are drilled, the drills being guided by the bushings *C* and *D*. Then the clamp is loosened and the work is rotated 180 deg., being located by the two pins *E* and *H*, which enter the two holes just drilled. In this position, the remaining seven holes are drilled. The under side of the bushing plate, against which the work is clamped, is made in the form of a V-block to insure the correct alignment of the work with the bushings.

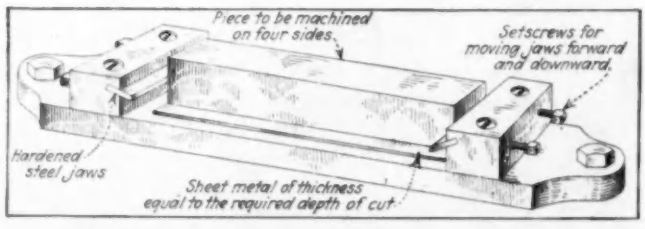
Milling Vise With Hold-Down Jaws

By H. E. Brookman
University of South Dakota

In our work with the younger students in our engineering courses, we find it necessary to mill $1\frac{3}{8}$-in. hot rolled square steel bars 17 in. long, on all four sides. The bars are used in the process of making small vises, and it is necessary that the machining leave the bars square and with sides parallel. It is difficult for the inexperienced person to clamp a bar in the ordinary machine vise in such a manner that it does not lift at one end or along one edge when the vise screw is drawn up, because of the usual worn condition of the vise, or because of slight projections on the bar that prevent its seating squarely.

To avoid this trouble, the simple holding fixture shown in the illustration was devised. The bars are cut off in a power hack saw, leaving the ends fairly square. The hardened steel jaw pieces are ground sharp along one edge as shown. When the setscrews are moved forward the jaws advance, the edges which have cut slightly into the ends of the bar, moving also downward, and holding the work firmly against the planed surface of the fixture. After the cutter has passed over the first face, the bar is turned 90 deg. and the next face is cut.

Since the milling machine used is of the Lincoln type, and it is not convenient to change the elevation of the cutter, a piece of sheet metal of the thickness of the required depth of cut is placed on the face of the fixture under the work, after two sides have been milled, and the cutting is continued. The metal sheet raises the bar, and the work is finished true and square.

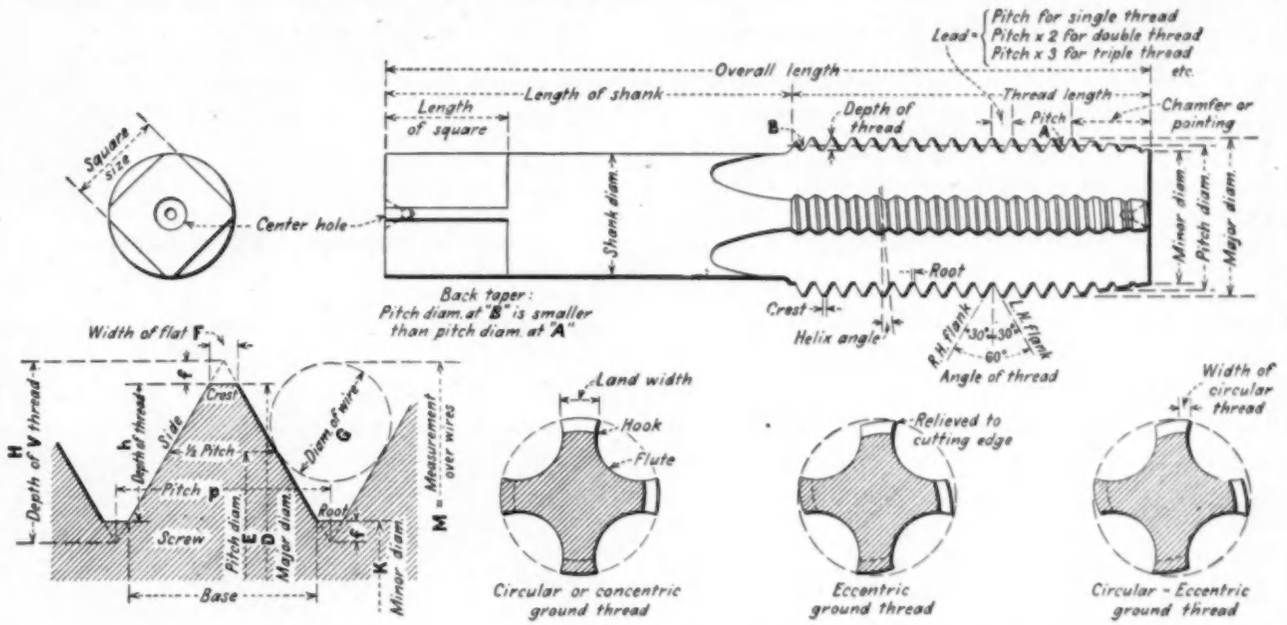

Piece to be machined on four sides
Setscrews for moving jaws forward and downward
Hardened steel jaws
Sheet metal of thickness equal to the required depth of cut

Sharpened blades are used to draw the work down

While it is customary to normalize many dies by reheating after hardening, it has been suggested that periodical reheatings, from time to time during use, will restore original properties and will add measurably to die-life.

Taps and Screw Threads

Some Fundamental Definitions



The following definitions, which enter into specifications and methods of designation, refer both to taps and to screw threads. They represent the accepted meanings of terms used in ordering, and using, taps and screws.

ANGLE OF THREAD. The included angle between the thread sides, measured in a plane including the tap axis.

BACKED-OFF. A term used to describe a tap which is relieved eccentrically in the angle of the thread. Usually the backing-off does not begin exactly at the cutting edge.

BACK TAPER. A slight relief on a tap which makes the pitch diameter near the shank end of the thread somewhat smaller than that near the point of the tap.

BASE OF THREAD. The distance through the bottom of the thread between two adjacent roots.

BASIC SIZE. A theoretical or nominal size of pitch diameter, major diameter, or root diameter.

CHAMFER (sometimes referred to as "start" or "pointing"). The method of pointing or tapering the end of the thread, to distribute the work over several threads.

CREST CLEARANCE. The space between the top of the thread and the root of its mating thread.

FLAT ON SHANK. A cut-away portion of the shank of a tap which serves as a seat for a set-screw.

HELIX ANGLE. The angle made by the helix of the thread at its pitch diameter with a plane perpendicular to the axis of the thread.

HOOK. Rake or undercut on the faces of the teeth of a tap. This is varied for different materials and conditions of tapping.

INTERRUPTED THREAD. Applied to taps with an odd number of flutes. Every other thread is removed, thus removing part of the cutting friction of the tap in a hole.

LAND. The portion of a tap which is not cut away by the flute; in other words, the portion upon which the threads are made.

LARGE SHANK. A term applied to a tap which has a shank diameter approximately equal to the major diameter of the thread. Used on smaller taps for added strength.

LEAD. The distance a screw or tap advances along its axis in making one complete turn.

MAJOR DIAMETER (otherwise known as outside diameter). The largest diameter of the outside of the thread.

MINOR DIAMETER (otherwise known as root diameter). The smallest diameter of the thread, measured diametrically across two opposite roots.

NECKING. The cut-away portion of a tap between the threaded portion and the shank.

PITCH. The distance from a point on the screw thread to a corresponding point on the next thread, measured parallel to the axis.

PITCH DIAMETER. On a straight thread, the diameter of an imaginary cylinder passing through the threads in such a way as to make equal the width of the threads and the width of the corresponding spaces cut by the surface of the cylinder.

SMALL SHANK. Applied to a tap which has its shank size equal to or less than the root diameter of the thread. This is common to hand taps of $\frac{7}{8}$ in. and larger.

SPIRAL POINT. A method of sharpening the point of a tap to give a shear cut on the first few threads.

SQUARE. Flatted portion of the end of a tap used for driving the tap positively.

STRAIGHT THREAD. A thread where the pitch diameter continues the same from one end to the other, except for the back-taper relief.

TAPER THREAD. A thread which has a pitch diameter increasing according to some constant ratio.

Courtesy of John Bath & Company, Incorporated.

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American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

Vol. 72 NEW YORK, JANUARY 2, 1930 No. 1

The President's Final Word to Industry

WHETHER "this first, nationwide, democratic effort to control the business cycle" will fulfill its early promise of success is a problem only for the professional prophet. It has one, and only one, vital condition precedent, the final word of President Hoover, "Work!" For such work as he prescribes is presupposed to be compounded of intelligence, intelligent faith, and sincere, constructive effort.

Pile fact upon fact, committee upon committee, conference upon conference, and leave out sturdy, individual, and co-operative work—the business of the nation will come to a gigantic and ineffective deadlock.

But, as water is the universal solvent of the elements of this physical world, so work is the universal solvent of the business world. However much one may be tempted to let time evolve an answer to the present economic situation, it is the plain privilege and duty of every American to line up solidly behind his President.

*

Navigation in Overseas Markets

DURING the self-navigation of business, when the manufacturer-navigator is confronted by the narrows of domestic market contraction and saturation, he may be tempted to change his course temporarily into the broader waters of overseas trade. As the divorcee remarked about her lately discarded, and about to be remarried, husband, "He will only exchange one set of troubles for another."

All metaphor and simile aside, any manufacturer will surely discover new troubles in export, unless he applies the same intelligent preplanning and effort that he applied to domestic marketing.

The sagacious manufacturer will not fail to apply the Four Basic Principles of Industrial Marketing to export even as to home trade; for each principle forms an essential step in breaking through the sales resistances which surround any industrial buyer in any market anywhere:

"1. MARKET DETERMINATION. A clean-cut job of selecting and rating the worth-while markets according to potential volume.

"2. BUYING HABITS. With his most profitable markets selected, the manufacturer will study their buying habits to ascertain which men control the buying and how they buy.

"3. CHANNELS OF APPROACH. He will approach his "buyers" in each market through the channels where they naturally look for information on equipment, materials, and supplies.

"4. SALES APPEALS. He will develop as his sales appeals those that tie his product directly to self-interest of the 'buyer' in each of his markets."

*

No Time for Short Cuts

IN THE park just west of the Washington Monument there is a sign that says "No Short Cuts." That sign might well be transferred to the front of the Department of Justice, and supplemented by another saying "Trade Associations Please Take Notice." Because the Department of Justice is carrying on business as usual, regardless of alterations in margin accounts, and still objects to violations of the Sherman and Clayton acts.

Trade associations that feel tempted to try short cuts because of the general confusion that has followed in the wake of the stock crash would do well to remember that the duty of the Department of Justice is to apprehend violators of such statutes as the anti-trust laws, and that the woes of speculators have not had any appreciable effect in changing the attitude of the Department toward its duty. In other words, short cuts are not advised.

*

Beginning Volume 72

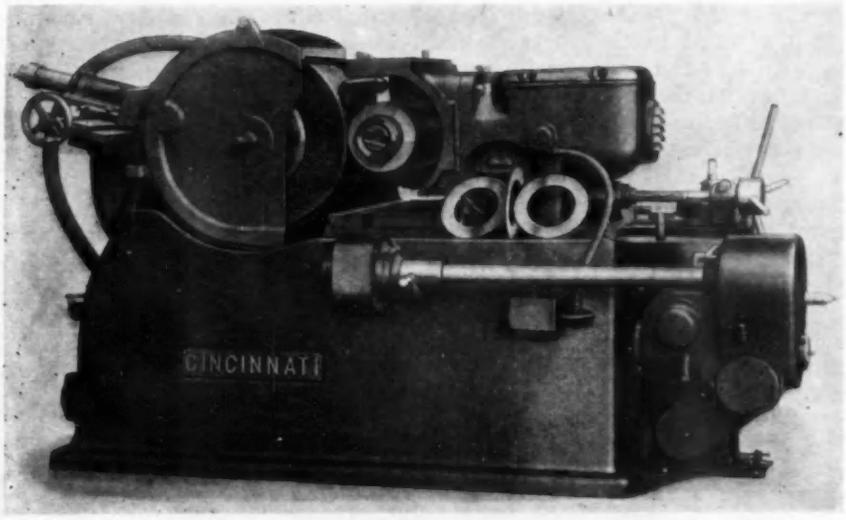
WITH this issue the *American Machinist* begins its seventy-second volume. Founded more than fifty-two years ago by Horace B. Miller, with Jackson Bailey as its first editor, it has continued under the same name ever since, and has been edited by Frank F. Hemenway, Fred J. Miller, Frederick A. Halsey, Leon P. Alford, John H. VanDeventer and Ethan Viall, in that order. The present editorial staff, headed by Kenneth H. Condit and Fred H. Colvin, consists of S. Ashton Hand, Frank J. Oliver, Jr., George S. Brady, H. R. LeGrand, Chester B. Lord, Herbert Chase, W. W. Dodge, George F. Nordenholt, E. J. Tangerman and C. G. Smith.

SHOP EQUIPMENT NEWS

Cincinnati Semi-Automatic Plunge Cut Grinder

A SEMI-AUTOMATIC plunge cut grinder, which embodies in its design a special adaptation of the center-type principle of grinding to the units usually employed in centerless grinding, has been developed by Cincinnati Grinders Incorporated, Cincinnati, Ohio.

The frame work of the No. 3 centerless grinder serves as the basic unit about which the machine is constructed. In place of the regulating or feed wheel used on centerless grinders, an extended spindle, which is employed as a work arbor, is supplied on this machine. Parts similar to clutch facing rings, transmission stub shafts, disks of various types, and brake shoes are mounted on a hollow mandrel placed on the spindle. A bayonet lock secures the mandrel quickly.



Cincinnati Semi-Automatic Plunge Cut Grinder

The movement of the work slide to the grinding wheel is cam controlled. By throwing a single hand lever, the work starts to revolve and feed into the grinding wheel. The cam controlling this movement is arranged so that the work advances rapidly to the grinding wheel, and then proceeds at a slower rate until the correct diameter has been ground. A short period is next allowed for a complete rounding-up action, after which the work backs away rapidly from the grinding wheel and rotation of the arbor stops automatically. This semi-automatic work cycle reduces non-grinding time to a minimum.

The in-feed work slide is arranged for a maximum reciprocation of $\frac{3}{8}$ in. and also for an up and down oscillation. An individual motor drives the reciprocation and oscillation units. A cam controls the oscillation, or up and down movement, of the work slide. The desired reciprocation of the work slide is obtained by an eccentric arrangement on the trunion. All of these movements are automatic, a single movement of the lever at the front of the machine starting the cycle of feeding, oscillating, reciprocating, and backing away.

By operating on the plunge cut principle, a fast rate of stock removal is obtained. Provision for this is made by equipping these machines with built-in motors having ratings as high as 40 hp. This grinder is capable of using a 24-in. grinding wheel to the limit of its cutting capacity. A chain drive is used from the motor to the grinding wheel spindle. Texrope drive may be supplied as an alternative.

Work up to $15\frac{1}{2}$ in. in diameter can be accommodated. The 10-in. wide grinding wheel provides sufficient grinding contact for handling a large number of parts in one cycle. When grinding clutch facing rings, 60 pieces are mounted on the mandrel, and two mandrel loads are ground to exact dimensions each minute. Production on this job equals 6,000 finished pieces per hour. For truing the grinding wheel, the machine is equipped with a Ross-type wheel dresser. This grinder may be arranged with centers and a work driver to handle certain classes of work.

"Borod" Welding Rod for Hard Facings

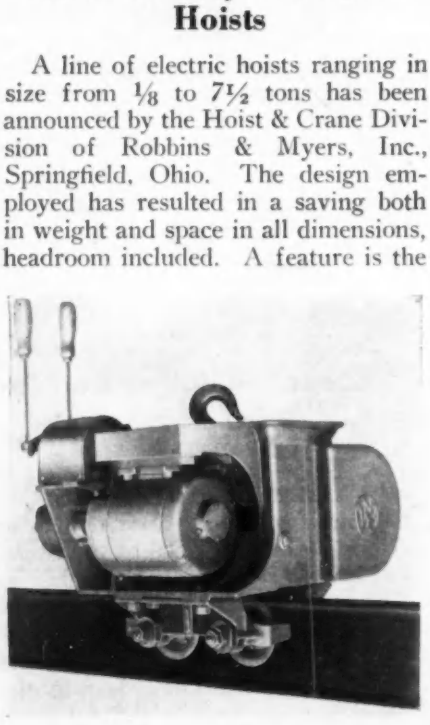
To give, in a hard facing, resistance to abrasion comparable only to tungsten carbide, the "Borod" welding rod has been developed by the Stoody Company, Whittier, Calif. This rod consists of a soft steel sheath or outer wrapper in which is held an intimate mixture of fine grains of tungsten carbide and other alloys held in place by a suitable binder. When melted down by the heat of either the electric arc or the oxyacetylene flame, Borod forms a hard wearing surface. The soft steel sheath, with its lower melting point, fuses first, and, as it melts, carries with it the particles of tungsten carbide. Part of the tungsten and part of the carbon of the tungsten carbide unite with the iron to form a tungsten-iron-carbon alloy, which intermingles with the iron and steel. Part of the tungsten carbide is unaffected by the fusing process and remains in the alloy mixture. The proportions have been determined so that there is a sufficient amount of tungsten carbide in the original rod to give a deposit saturated with tungsten carbide particles, held in place and cemented together by the alloy mixture.

It is claimed that the deposit from Borod welding rod has all of the wear

resistant properties of pure tungsten carbide, but, in addition, has the strength and penetration qualities of alloy steel. Where such a deposit is fractured, the surface of the fracture has the appearance of a fine tool steel with uniform grains. The material has a hardness reading of about 65 to 70 on the Rockwell C scale, but, in an abrasion test, the deposit compares favorably with pure tungsten carbide

Robbins & Myers Electric Hoists

A line of electric hoists ranging in size from ⅛ to 7½ tons has been announced by the Hoist & Crane Division of Robbins & Myers, Inc., Springfield, Ohio. The design employed has resulted in a saving both in weight and space in all dimensions, headroom included. A feature is the



Robbins & Myers Electric Hoist

cast steel trolley, which is adjustable to nine sizes of I-beams.

The main frame used in these electric hoists is made of "Aremite" alloy metal, which is produced by the electric process, and which has a tensile strength of 35,000 lb. per sq.in. and an elasticity that enables it to withstand shock more readily than cast iron. In addition, it has a better finished appearance than cast steel. An aluminum finish is applied throughout, which makes for attractive appearance and provides protection against damage and exposure.

The hoist is accessible in all its parts, in that the entire hoisting mechanism including the drum can be withdrawn through the front of the main frame after the cover has been removed. The motor and motor brake can be removed as a unit, and the controller also. Two stages of speed reduction by spur gearing are employed. All gears are of alloy steel, heat-treated, and the motor pinion is hobbed directly in the short motor shaft extension, thus making it especially suitable for constantly reversing tooth loads at motor speeds. Hyatt roller bearings are employed.

Diamond Type H Universal-Head Surface Grinding Machine

BY THE inclusion of a universal head in the design of the type H surface grinding machine, manufactured by the Diamond Machine Company, Providence, R. I., grinding of surfaces at all angles can be done with simple set-ups. It should be noted that the universal head is an integral feature of the machine, and that the angle is changed simply by loosening two clamp screws and turning the wheel to the angle desired. Fig. 2 shows the head grinding a flat surface with the axis vertical, a cup wheel being used. The wheel can be set accurately to a protractor placed on the table or, if desired, a protractor can be attached to the machine as extra equipment. Wheel guards for disk, cup, and dish abrasive wheels are furnished.

Hydraulic table drive through cylinders and pistons gives a wide range of speeds, which may be changed instantly by turning the control valve. The fast speeds and the smooth operation insure high production and high quality of the finished work. Centralization of controls makes it possible for the operator to perform all necessary functions from his position at the front of the machine.

In addition to being designed for the usual size of work, the machine is also built with capacity for larger work. The standard size handles work 16 in. wide by either 48 or 72 in. long and 12 or 16 in. high, depending upon the wheel used. Four T-slots running lengthwise of the table and suitable for ⅝-in. bolts on 4 in. centers give ready means for setting up.

While the specifications hereinafter described are for the machines mentioned above, extra-size machines of standard design, having different capacities of length, width and kind of work handled, can be furnished.

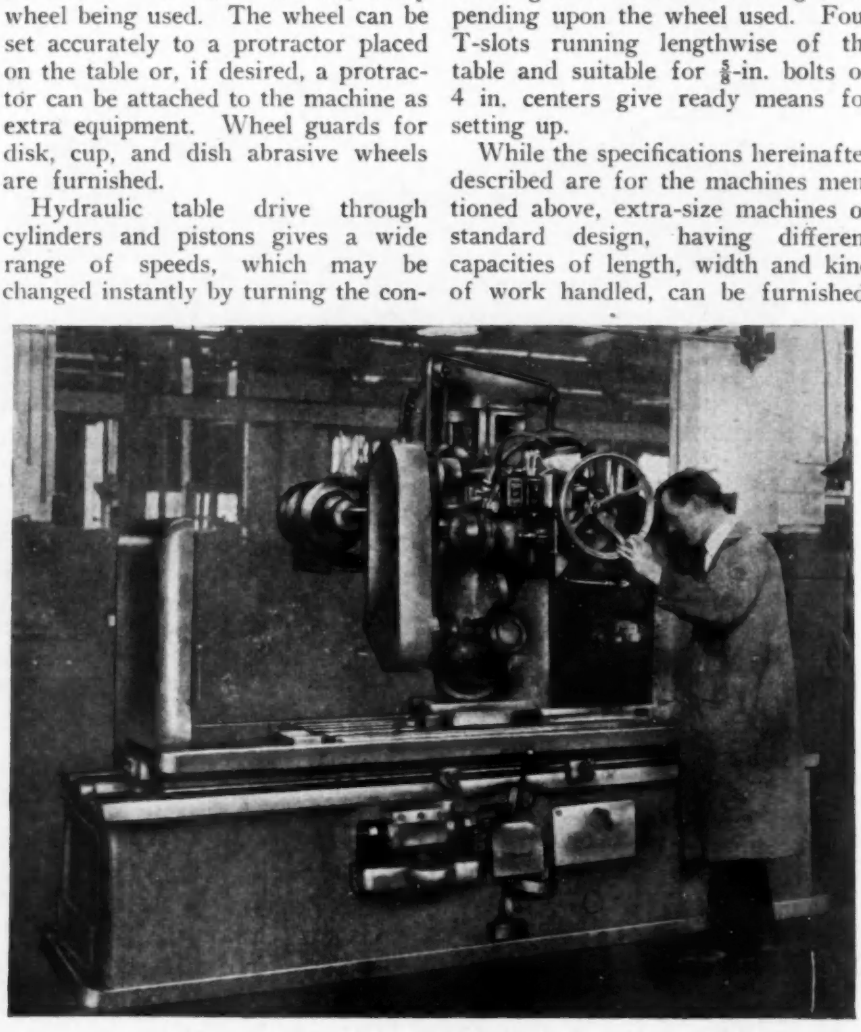


Fig. 1—Diamond Type H Universal-Head Surface Grinding Machine

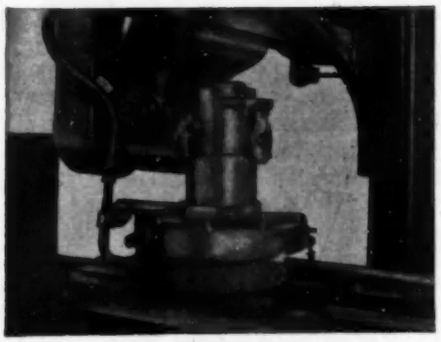


Fig. 2—Close-up of the universal head

On the particular machines mentioned there are four cross feeds of 0.025, 0.050, 0.100, and 0.200 in. per stroke. Rapid traverse is at 17.75 in. per minute. Vertical feeds are 0.0125, 0.025, 0.050 and 0.100 in. per stroke, with rapid traverse at 8.80 in. per minute. The power, cross, and elevating feeds cannot be engaged at the same time. Hand feed is provided for both the cross and the vertical feeds. The total table travel is 60 in. or 84 in., which is ample to clear the work. The wheels used are 12 in. in diameter by 1½-in. face by 1½-in. hole and run at a spindle speed of 1,500 rev. per minute.

Coolant is supplied from a 40-gal. tank cast integral with the bed, there being a separate 7-gal. sediment tank located conveniently and also removable easily. The coolant pump is of the direct-connected, motor-driven, vertical-spindle type. It is of ¼-hp. size operated at 110 volts on 60-cycle, single-phase circuits. The other two motors to drive the spindle and the oil pump, respectively, are of 5 and 2 hp., and run at 1,800 and 900 rev. per minute, respectively.

The floor space required is 154 or 202 in. in length by 83 in. in width. Height from floor to table is 30 in., and from the floor to top of the vertical screw of the head upright is 82 in. The weights are 8,500 lb. for the 48-in. machine and 9,500 lb. for the 72-in. machine.

Lodge & Shipley 18-Inch Manufacturing Lathe

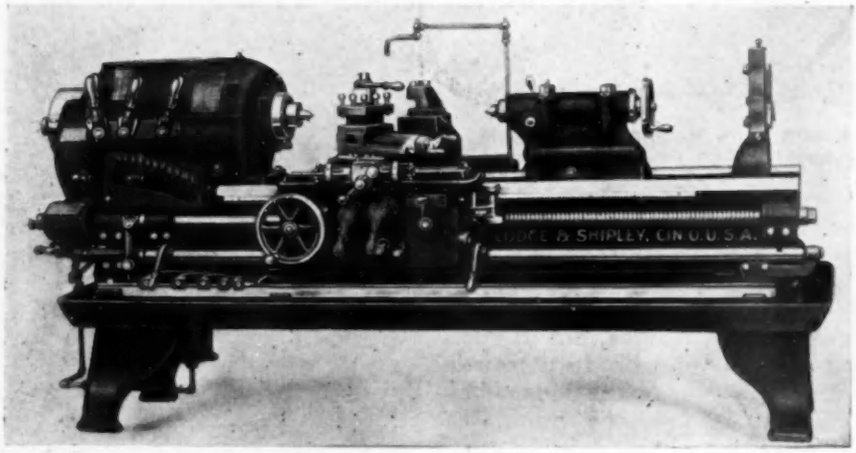
EQUIPPED with a number of attachments that particularly adapt it to production work, an 18-inch manufacturing lathe has been placed on the market by the Lodge & Shipley Machine Tool Company, Cincinnati, Ohio. This machine is of a type between the regular engine lathe and the automatic, and is equally effective on single piece jobs as on large and small lots of pieces, thus bridging the gap between the above two types. In comparison to the regular lathe, its cost is only slightly higher, and ordinary lathe tools are used. Setting up on the manufacturing lathe is not an intricate operation, as any good lathe hand can do it quickly and correctly. In addition to the regular equipment, the following attachments are furnished: Pan, pump and tubing, multiple length and diameter stops, connected compound and plain rests, a four-way tool block, and a high-duty tool block. Special attachments also furnished.

A multiple length stop provides a direct method of duplicating lengths automatically. Five stop dogs are furnished, which are adjustable along a stop-bar to trip the feed at any desired position. A flat lever attached to the lower left-hand corner of the apron engages the dog fastened to the stop bar. This stop bar has a short end movement, which is transmitted by a pivoted lever to disengage the jaw clutch on the feed rod, tripping the feed automatically and positively. To re-engage the feed, the flat lever is raised, releasing a powerful spring, which throws the clutch back into engagement and returns the stop bar to its original position.

The connected compound and plain rests, with a four-way tool block in the front rest and a high-duty tool block in the rear rest, provide five tools instantly. Variations of this arrangement are possible whereby either the high duty or four-way tool block is replaced by a special tool block with multiple tooling, depending upon the requirements of a particular job. Each of the tools in the four-way block can be swung into the cutting position and returned repeatedly with no more than 0.001 in. variation.

The multiple diameter stops, although not automatic in operation, are positive and accurate. They are located directly back of the cross feed handle, making them readily accessible. Twelve stops are furnished, six for front and six for rear tools. When used in conjunction with the length stops, they provide a fast, positive method of duplicating various diameters and lengths. The tool is quickly run in until the stop is reached, the length feed is then thrown in, and the cut is under way. At the desired position, the length feed is disengaged automatically. When not in use, neither of these attachments interferes with the regular operation of the lathe.

The pan, pump, and tubing permit the use of much higher cutting speeds without danger of burning up the tools. A constant stream of lubricant flows directly on the cutting edge of the tool. The pan is of heavy sheet steel and is leak-proof. The pump is of the geared type.



Lodge & Shipley 18-Inch Manufacturing Lathe

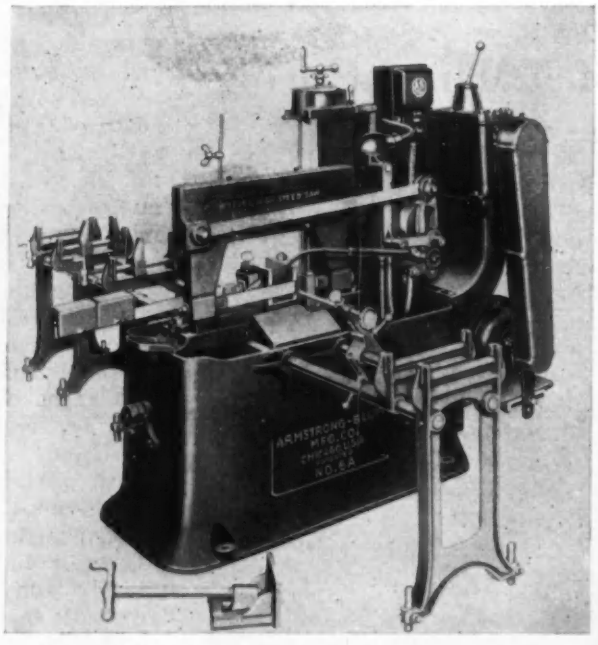
"Marvel" Nos. 6 and 6A High-Speed Hack Sawing Machines

IN ORDER to secure maximum efficiency with high-speed steel hack saw blades, two models of "Marvel" high-speed hack sawing machines have been developed by the Armstrong - Blum Manufacturing Company, 333 N. Francisco Ave., Chicago, Ill. They have been designed for heavy duty and fast cutting and are therefore of sturdy construction. Two outstanding features are the ball-bearing saw frame slide and the combination positive and friction feeding mechanism.

Among the claims made for the straight-race ball-bearing saw frame are that it maintains a rigid saw frame because of the absence of wear; it minimizes friction in a bearing that travels at the rate of 10,000 ft. per min. and thereby eliminates 60 per cent of the power losses; it also relieves all working parts from excessive friction load; it reduces the oil consumption of the frame bearing to a few drops weekly, and it practically eliminates the chief cause of break down in a hack saw machine. The anti-friction arm will withstand feed pressures up to 1,200 lb. It is further claimed that it is possible to apply as much tension to the saw as is needed to draw it taut for accurate straight cutting without distorting and binding the saw frame. Quick-acting blade holders are provided. The drive mechanism is similar to that on other Marvel machines, giving quick return with a full ⅛-in. lift on the non-cutting stroke.

The positive and friction feeds can be operated independently or in combination, so that the advantages of each can be secured. A convenient scale shows the amount of feed being obtained in thousandths. Hand control is also provided by means of the ball handle at the top of the vertical square-thread feed screw, similar to the hand feed on a shaper head.

Another feature of the machines is the use of a four-speed automotive type transmission, by means of which four sawing speeds of 73, 93, 118, and 147 strokes per min. can be selected at will. A ball-handle lever is employed to make the shift. Hardened high-carbon steel gears are used in the case, and the shafts are mounted on ball bearings. Drive is either by single pulley to a countershaft or by motor through a roller chain. A 1½-hp. motor is specified, and it is carried on an adjustable base to allow for take-up in the chain. No clutches are used in the drive. Instead an automatic switch, controlled by a push button, is used to stop and start the motor, as well as to jog it.



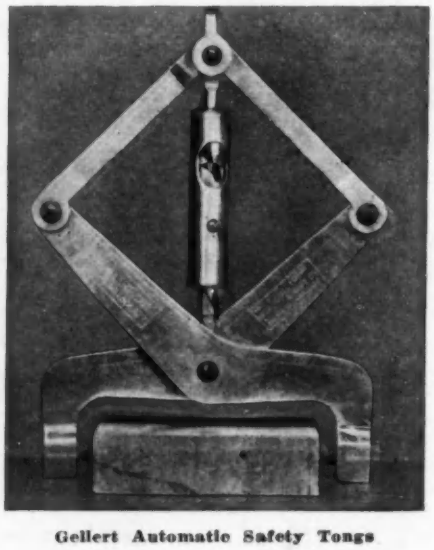
"Marvel" No. 6A High-Speed Hack Sawing Machine equipped with automatic stock feed and four-speed transmission

The No. 6 machine is a plain, single-cut unit. The No. 6A saw is similar in construction, but in addition is equipped with an automatic bar feed, shown in the illustration, for continuous production work. In this case the bar stock is held in two vises that slide along guide rods under the impetus of a friction feed operating through a flexible copper rope. On the other side of the machine is an adjustable stop which limits the travel of the stock and gages the size of piece. Work up to 6x6 in. can be cut in either machine. It is claimed that a 6-in. round mild steel bar can be cut off in 6 min. and other sizes in proportion. In an actual demonstration, the manufacturer cut off 7,500 pieces of 1½-in. round mild steel in 75 hours, representing a production rate of 100 cuts per hour.

The machine proper occupies a floor space of 3x5 ft. The No. 6 model weighs 1,700 lb.; the No. 6A, 1,900 pounds.

Gellert Automatic Safety Tongs

The Gellert automatic safety tongs, manufactured by Heppenstall Forge & Knife Company, Pittsburgh, Pa., may be suspended from any kind of a hoist and manipulated by means of the rope by the craneman. Their use therefore saves the services of ground men as well as doing away with hazards to such persons when handling heavy or hot materials. The tongs are suitable for lifting various kinds of metals, hot or cold, bulk goods such as bales and hard paper rolls, barrels and kegs of nails, and wire coils. All tongs are made to handle more or less standard size articles. Certain special forms have been developed. High-temperature handling has required special steels



Gellert Automatic Safety Tongs

and grips, delicate or sensitive surfaces have necessitated special jaws or grips, and limited clearances in overall heights or for jaw action have demanded the development of special designs—but the principle employed is the same in all cases.

The design of the tongs proper gives positive and maximum gripping action. For light and small loads they are made in the single shear or blade design and for large and heavy loads in the double or split blade design, which relieves the center bolt of all but low shearing stresses, balances the entire assembly, and eliminates the tendency to twist or snap off. Sturdy construction is used for the automatic latch, which is fully self-contained, and consists of two moving parts only, namely, the connecting rod and the revolving cross head. Suspension and operation are handled by the same rope from any kind of hoist. A tandem rope may be used where twisting is to be avoided. Fully automatic alternative gripping and release of the load upon each up and down movement is obtained.

Melling Crankshaft Turning and Cheeking Machine

FOR simultaneously turning the bearings and facing the cheeks of crankshafts with either seven or nine bearings, the machine illustrated has been placed on the market by the Crankshaft Machine Company, Jackson, Mich. This particular model is for use on Franklin crankshafts, which have seven bearings.

Simple design is a feature of the machine. The crankshaft is held at each end by chucks, which are carried on spindles driven by a shaft at the front of the machine through a pair of spur gears driving each spindle. A table at the rear of the machine carries the seven tool blocks, each of which carries two cheeking tools and one bearing turning tool. The forward feed of the table advances the tools simultaneously to the work. Motion for this purpose is carried to a shaft in the rear of the machine for a chain drive. This shaft transmits power through a simple feedbox, which is essentially a reverse mechanism to provide for backing up the machine in case some abnormal condition should arise. From the feedbox, power is carried to a cross shaft, on which is mounted a cam drum actuating the table.

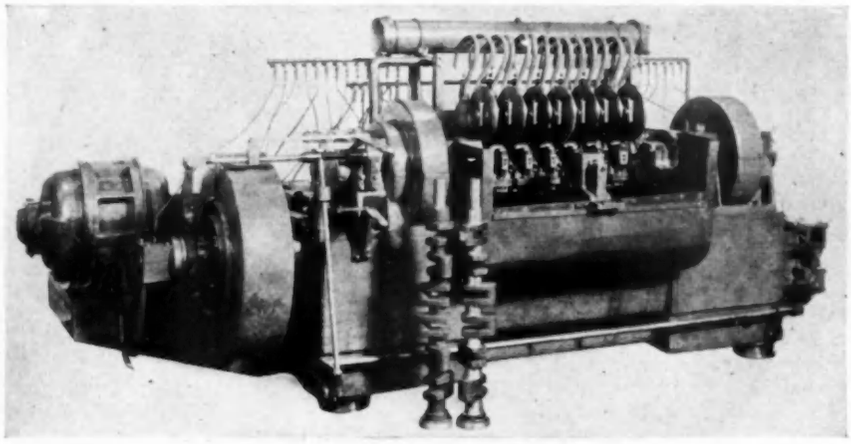


Fig. 1—Melling Crankshaft Turning and Cheeking arranged for machining a seven-bearing Franklin crankshaft

It will be seen from Fig. 2 that each tool block is provided with a roller to support the pressure of the cut. Each tool block is pivoted and, as it feeds into the work, the roller is held in contact with the top of the bearing to be turned. The pressure of the cut tends to rock the tool block downward on its pivotal support, but this is prevented by the roller.

In addition to these rollers which take the tool thrust, there is a steadyrest that engages the center bearing on the crankshaft. This steadyrest consists of a pivoted bar, at the upper end of which there is a link carrying a roller that engages the center bearing on the crankshaft. At its lower end, this pivoted bar engages with a roller on the end of a rod extending from the table. The

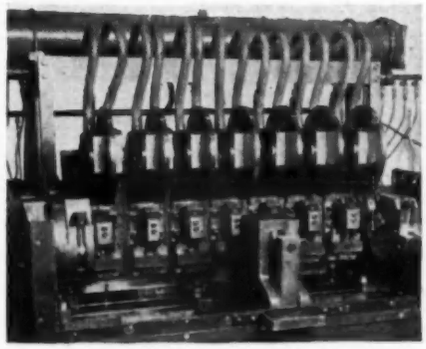
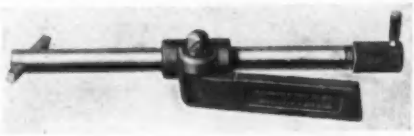


Fig. 2—Each tool block is provided with a roller to take the pressure of the cut

steadyrest does not come into action until the cheeking operation has been completed and the turning of the crankshaft bearing is about to start. When the table advances, the rod and the roller at its forward end rock the bar about its pivotal support and move the steadyrest roller forward so that it is always firmly in contact with the work. With this machine, it is not necessary to spot a bearing for the steadyrest before starting the operation of the machine. On seven bearing crankshafts the machine finishes the turning and cheeking operations in 5 min., floor-to-floor time.

Aulenback Wrenchless Boring Tools

Intended for boring mills, turret lathes, and miscellaneous boring, the wrenchless boring bar illustrated has been placed on the market by the Aulenback Tool Company, 18 Grafton St., Worcester, Mass. It employs a wrenchless, hand-operated locking device for loosening and tightening tool bits. By a slight turn of the handle towards the operator, the cutting bit is loosened and can be taken out for regrinding. After the bit is replaced, a slight turn away from the operator tightens it.



Aulenback Wrenchless Boring Bar

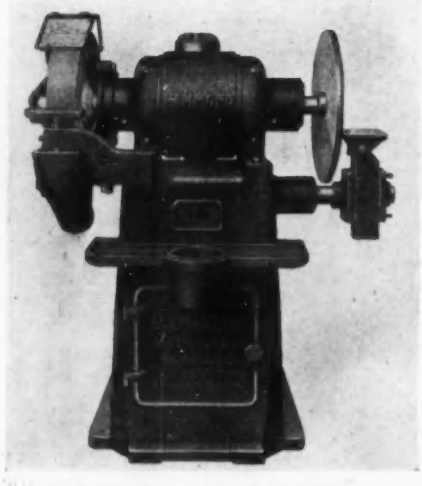
The bar itself is made and drilled from one piece of alloy steel, and is heat-treated and ground. The locking device is provided at the end of the bar. The recommended angle for the tool bit is 30 degrees, as it makes the tool universal for boring through, bottoming, boring to a shoulder, and threading. It is claimed that the tool can be used for deep threading and also for outside turning where the work is too large to ride over the carriage.

The bar can be made in such small sizes as $\frac{1}{4}$ and $\frac{3}{8}$ in. in diameter, these sizes being suitable for bench lathes and toolroom work. The standard range varies from $\frac{5}{8}$ to 2 in. in diameter and from 9 in. to $16\frac{3}{8}$ in. in length.

The tool bits accommodated are $\frac{3}{16}$ to $\frac{1}{2}$ in. square. One high-speed cutter is furnished with each bar.

Hammond Combination Disk and Production Grinder

Four sizes of the combination disk and production grinder shown have been placed on the market by the Hammond Machinery Builders, Inc., Kalamazoo, Mich. These sizes are 2, 3, 5 and $7\frac{1}{2}$ hp. for 220- and 440-volt, 25- to 60-cycle, a.c. circuits, and 110- and 220-volt d.c. circuits. They are suitable for disk grinding operations where the number of such operations is limited, as the solid grinding wheel can be used for tool or casting grinding. The machine is therefore suitable for the shop with average production. Standard equipment includes one steel, adjustable, wheel guard, a steel disk, and a plain table, as shown. A universal lever feed table can be furnished in place of the plain table, if so desired. These machines can also be fitted with disks on both ends, with either the plain or universal lever tables.



Hammond Combination Disk and Production Grinder

As in other machines manufactured by the company, a 40-deg. temperature rise motor is fitted, together with an air cleaner, push-button control and an automatic motor starter, having thermal overload, low voltage, and phase failure protection. The automatic starter is mounted conveniently on the inside of the pedestal door. Completely inclosed ball bearings are used and they are mounted to take both radial and lateral thrusts. Large size oil reservoirs are provided.

The grinding disks are machined on both sides, so that two disk wheels can be mounted at one time. After one is worn, the disk can be reversed.

General Electric Controller for Low-Head Cranes

The General Electric Company, Schenectady, N. Y., announces a self-contained, triple drum controller with a resistor mounted on the back, for the floor operation of the three motions of small, low-head cranes.

The general construction is similar to that of other crane controllers of the standard General Electric line, with the rope wheel having spring return, and the vertical or horizontal handle made interchangeable. The horizontal handle arrangement is provided in case it is desired to install the controller in a crane cab for the usual method of manual operation. In such an installation the resistor can be separated from the drum switches, which is necessary if all three motors are rated the full 10-hp. rating of the controllers.

General Electric Controller for Low-Head Cranes

Paasche Tank and Gun for Spraying Body Noise Deadening Compound

The 200-gal. pressure tank and the type UUE spray gun, shown in the accompanying illustrations, were recently developed by the Paasche Airbrush Company, 1909 Diversey Parkway, Chicago, for spraying "Inco" body deadener on the inside of bodies to damp vibration or rumble. The particular installation shown is now used in the River Rough plant of the Ford Motor Company. In this installation the Paasche F539 tank is mounted on a balcony above the body line and has a 3-in. pipe at the base that branches to each side of the line.

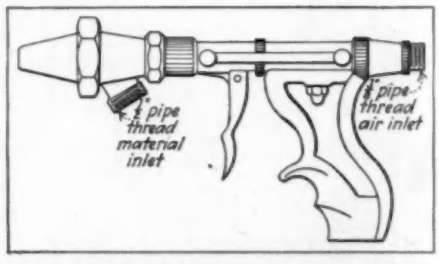


Fig. 1—Paasche Type UUE Special Air Gun for spraying body noise deadener on automobile bodies

The 200-gal. tank has a 25-in. cover so that the deadening material can be hoisted and dumped therein directly from barrels. Three barrels of 55 gal. capacity each are dumped into the tank before the operation is begun.

A connection to the air gun is by $1\frac{1}{4}$-in. pressure hose somewhat similar to that used in gasoline service stations. This hose is connected by a $\frac{3}{4}$-in. reducer to the gun, which has a $\frac{1}{2}$-in. pipe thread at the inlet. Nozzles of extra large size ranging from $\frac{3}{8}$ to $\frac{1}{4}$ in. are supplied for this type of work. The air line is connected to a $\frac{3}{8}$-in. pipe thread also.

The Inco body deadener is made by the International Paint Corporation and consists mainly of asphaltum heavily loaded with oils which protect

Fig. 2—Paasche Type F539 200-gal. Air-Agitated Pressure Tank used to store "Inco" Body Deadener

the metal; in addition to these hydrocarbons, there is incorporated in the mixture a great deal of sawdust. When applied to the interior of a body, this material becomes tacky in a few minutes, but never gets really hard. The mixture is sprayed on the interior of the body after it has been painted in the usual way.

Brown & Sharpe Nos. 614 and 617 Depth Gages

The Brown & Sharpe Manufacturing Company, Providence, R. I., has recently announced two depth gages, Nos. 614 and 617. Graduated rod depth gage No. 614 measures the depth of large or small holes from 0 to 3 in. directly in 64ths. The wide base and slender rod make this tool convenient for use in measuring

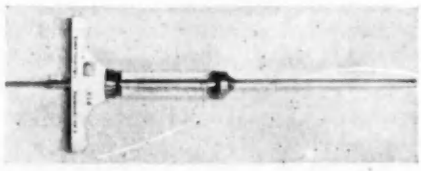


Fig. 1—Brown & Sharpe No. 614 Graduated Rod Depth Gage

holes of either large or small diameter. The rod is graduated each inch for three inches. For the first $\frac{5}{8}$ in., the rod is $\frac{1}{16}$ in. in diameter, and the remainder is $\frac{1}{8}$ in. in diameter. A base 2 in. wide by $\frac{1}{4}$ in. thick is used.

Drill point gage and depth gage No. 617 can be used for checking the angles of drill points when grinding them, and to determine whether the point is central. It may also be used as a depth gage for finding the depths of holes as small as $\frac{3}{32}$ of an inch in diameter. The graduated bevels on the head are ground to an included angle of 59 deg. The 6-in. rule is graduated in 32nds and 64s and a 6-in. rod $\frac{5}{64}$ in. in diameter is furnished for use in measuring the depth of small holes. The No. 617 has a range of 0 to 5 in. It may also be furnished to measure in metric units, if desired.

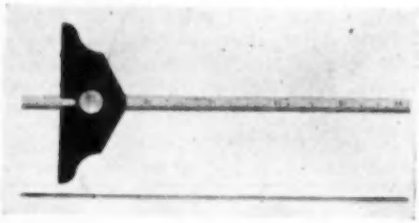


Fig. 2—Brown & Sharpe No. 617 Drill Point Gage and Depth Gage

REVIEW · OF · RECENT · PATENTS

Relating to the Machinery and Metal Products Industries

Metal-Working Machines

To the Saranac Automatic Machine Corporation has been assigned patent 1,726,528 on a wire-forming machine adapted for making wire bails and shaping them to the handle.

William Baird, Plattsmouth, Neb., has been granted patent 1,727,322 on a pneumatic hammer mechanism for upsetting car axles. It includes means co-operating with the bed plate to form an anvil, for centering and guiding the axle, and for indicating the extent of upset.

A machine for corrugating metal tubes and comprising two two-part rollers acting inside and outside of said tubes and a means for aligning the two rollers axially, is the subject of patent 1,727,358, granted to Charles Joseph Rhodes, of Wakefield, England.

Bertold Buxbaum, of Berlin-Charlottenburg, Germany, has been granted patent 1,727,427 on a cutting-off machine having a guide for the work, and a cutting member supported by a swinging plate with means for operating said plate.

A radial drill having a power transmission capable of giving twelve different rates of speed from a single rate at the prime mover is the subject of patent 1,727,606 assigned to the Cincinnati Bickford Tool Company.

Walter Nácken of Gruna, Germany, has been granted patent 1,727,664 on a multiple wire-drawing machine with a plurality of consecutive drawing drums, adapted to be raised and lowered into an out of mesh with gearing.

Patent 1,727,736, assigned to the Hanson-Van Winkle-Munning Company, relates to an apparatus for electrolytic treatment, comprising separate tank compartments, a common conveyor mechanism and other co-operating parts.

To The Trane Co. has been assigned patent 1,727,918 on a machine for corrugating metal tubes, having means for flexibly securing the tube to a rotating shaft and mechanism for successive inward and outward expansion of the tube.

To The Spun Steel Corporation has been assigned patent 1,728,002 on an apparatus for spinning sheet metal pulleys. The machine includes a headstock with a form die, a spinning roller and other co-operating parts.

A machine for making chaplets is the subject of patent 1,727,730 granted to Herbert S. Powell, of Utica, N. Y. The machine comprises means for winding a wire to form the base and stem of a chaplet and rotary means for carrying the said wire to said winding means.

Processes

A method of welding metal articles together by introducing between their surfaces a fusible metal having a slightly alloying affinity for said surfaces, and thereafter pressing these surfaces together at a temperature above the melting point of the fusible metal is the subject of patent 1,730,443, assigned to the General Electric Company.

To Deere & Company has been assigned patent 1,731,445 covering a method of producing a wheel hub which involves placing a collar on a core within a mold and thereafter filling said mold with molten metal.

Clarence Q. Payne of New York, N. Y. has been granted patent 1,731,790 on a method of producing anti-friction bushings from flat sheet electroplated with an anti-friction material of high hardness and bending the sheet into a bearing with the plated surface exposed to wear.

The method of forming composite castings by pouring two metals of dif-

ferent hardness and contractive properties in a rigid mold having a plate adapted to separate the metal and applying pressure simultaneously to both metals, is the subject of patent 1,731,060, granted to Carrol E. Reinhardt, Montreal, Que., Canada.

TRADE PUBLICATIONS

COMPRESSORS. The Chicago Pneumatic Tool Co., 6 East 44th Street, New York, N. Y., has published bulletin No. 788, the second edition, on vertical simplex air compressors of Type P 6. The details of construction and the specifications are furnished. The catalog contains seven 11x8½-in. pages.

CONTROLLERS, TEMPERATURE. The Brown Instrument Co., Philadelphia, Pa., has published a booklet entitled "Steel Treating Instrument Data Book," which presents a summary of 23 different heat-treatment processes where temperature control is important. The Brown instrument best adapted for a particular process is indicated. The catalog contains 32, 11x8½-in. pages.

CONVEYING EQUIPMENT. The Jervis B. Webb Co., 2921 East Grand Boulevard, Detrtoit, Mich., has published a catalog on the parts employed in its power-driven, continuous, overhead conveyor system equipment. Each part is illustrated by means of photographs and cross-sectional views, and the specifications are listed, together with the prices. A section is devoted to photographs of such conveyor systems in various plants. The catalog contains 35, 11x8½-in. pages.

DRILLING MACHINERY. The Fosdick Machine Tool Co., Cincinnati, Ohio, has published a series of bulletins on its drilling machinery. Machines described are the Nos. 1 and 2, No. 4, and the Nos. 5, 6 and 7 sensitive drills, respectively, a fourth bulletin being devoted to "Economax" radial drills. Each of the bulletins illustrates the various drive arrangements available and gives constructional features and specifications. All four bulletins are printed on 11x8½-in. pages.

LATHES, TURRET. The Warner & Swasey Co., Cleveland, Ohio, has published two catalogs on the Nos. 1A, 2A and 3A turret lathes, and on the flat turret lathe type either in the 2½x24-in. bar type lathe or the 12-in. chucking lathe. All parts of both types of turret lathes are thoroughly described and illustrated. Specifications for each machine are listed, together with dimension data for tooling equipment.

MARKING MACHINES. The Noble & Westbrook Manufacturing Co., 20 Westbrook St., East Hartford, Conn., has published catalog No. 29 entitled "Better Marking at Lower Cost," which illustrates the application of trade marks and other markings to various parts by the use of the machines manufactured. The catalog is profusely illustrated throughout and contains 64, 9x6-in. pages.

METAL CUTTER. The W. J. Savage Co., Knoxville, Tenn., has published Bulletin NS-102 on the "New Series Gray Metal Cutter" for cutting sheet metal. Various assemblies of the machine are illustrated, and the operation is described. The catalog contains eight 11x8½-in. pages.

POLISHING AND BUFFING LATHES. The Hammond Machinery Builders, Inc., formerly the Hill-Curtis Co., Kalamazoo, Mich., have published Bulletin No. 10 on the "Rite-Speed" electric polishing and buffing lathes of its manufacture. Each type is illustrated, and specifications are listed. Certain special structural features are also shown. The catalog contains seven 11x8½-in. pages.

POLISHING AND PLATING EQUIPMENT. The Hanson-Van Winkle-Munning Co., Matawan, N. J., has published catalog No. 109, which illustrates and describes all of the types of its equipment for polishing and plating, and also the various supplies needed for these processes. The entire catalog is profusely illustrated, and each item contains a certain amount of technical information useful to polishers and platers. The catalog contains 128, 11x8½-in. pages.

ROLLER CHAIN DRIVES. The Link-Belt Co., Indianapolis, Ind., has just published a roller chain drive data book, No. 1257, which is intended to be an aid in the selection and application of this type of chain. The booklet is bound in flexible, imitation-leather covers, and contains 96, 6x9-in. pages. It illustrates the construction of the chains and wheels, and presents many pages of illustrations showing typical applications on light- and heavy-duty industrial drives and on all types of machinery, tractors, trucks and farm implements. Full-size photographs are presented of each size of chain, and tables of principal dimensions and prices are included. An additional feature is the presentation of sprocket dimensions of stock and non-stock sizes up to 88 teeth. Some useful engineering tables are also included.

SPRING CHART. The Danly Machine Specialties, Inc., Chicago, Ill., has published a wall-type spring chart which covers the complete line of flat-round and square springs manufactured by the company. The table gives complete data as to the size of the hole in which the spring will work readily, the inside diameter of spring, the diameter of shaft or stripper bolt, the size of wire, loading, maximum compression to close, and prices.

TAPS AND DIES. John Bath & Co., Inc., 18 Grafton St., Worcester, Mass., have published catalog No. 12, containing information as to the method of thread grinding from the solid after hardening, and the system of the four Bath tolerances for hand taps. The catalog is called the "Ground Thread Handbook" and contains complete statistical information on American gage design plug and ring thread gages, as well as high-speed steel ground thread taps made by the company. It contains 176 5½x8-in. pages.

BUSINESS CONDITIONS AND OUTLOOK. The Chamber of Commerce of the United States, Washington, D. C., has published a booklet, "Business Conditions and Outlook," which gives a summary of the reports submitted to the National Business Survey Conference held under the auspices of the chamber at Washington, December 5, 1929.

INDUSTRIAL DAYLIGHTING AND AIRATION. The Detroit Steel Products Co., 2250 East Grand Boulevard, Detroit, Mich., has published two booklets, "Industrial Daylighting" and "Industrial Airation," which give a non-technical presentation of the methods to determine the daylighting and airation requirements of industrial buildings. The principles cited are of use to executives contemplating an industrial building or to plant, maintenance, and production engineers who wish to improve or alter daylighting and ventilating conditions in plants now operating.

SHARING PROFITS WITH EMPLOYEES. The Metropolitan Life Insurance Co., Policyholders' Service Bureau, 1 Madison Ave., New York, N. Y., has prepared a report entitled "Sharing Profits with Employees," which is based upon the experiences of more than eighty companies and includes profit sharing plans designed for executives, as well as those intended for the rank and file of employees. Each of these types is reviewed in detail.

SICKNESS AMONG INDUSTRIAL EMPLOYEES. The Treasury Department, U. S. Public Health Service, has published reprint No. 1266 from the public health reports on "Sickness Among Industrial Employees," which shows the frequency of disability lasting longer than one week from important causes among 165,000 persons in industry in 1927, and a summary of the morbidity experience from 1920 to 1927. The booklet is available from the U. S. Government Printing Office, Washington, D. C., at 5 cents per copy. It contains seventeen, 9x6-in. pages.

NEWS
OF THE WEEK

National Business Survey Conference Begins Stabilization Work

BEGINNING its work of stabilization, the National Business Survey Conference has issued a bulletin to trade associations which indicates the major steps to be taken in the immediate future in connection with the plans of the Conference. The Conference committee was appointed as a result of the business conference on Dec. 5, called at the instigation of President Hoover, and is purely temporary in nature. The larger committee, selected for direct contact with industries, particularly through trade associations, in the collection of information which by analysis will serve as a guide in the work, was announced recently. The bulletin, in part, reads:

"Outstanding in the Conference reports and discussion, and apparently meeting with unanimous approval, was a suggestion to which immediate attention should be invited. This suggestion is that advantage be taken of the next two or three months for repairs, maintenance, clean-up, general betterments, improvement, re-equipment, and replacements prior to the spring period when the large public and private construction programs reported to the Conference will be getting into full swing consequent enlarged demand for labor and materials. The Department of Commerce has set up a Division of Public Construction which is actively working to assist federal, state, and local authorities in development and co-ordination of their programs, while the trade associations and chambers of commerce are also co-operating in connection with both public and private major construction programs. Time is, however, required for preparation of plans, for tenders, and for financing. It is, therefore, obvious that these suggestions for repair and betterment work during the intervening months have much importance not only from the point of view of sustained employment and buying power —one of the major objectives of this organized effort which American business men have undertaken at President Hoover's request—but also, in many cases, from the point of view of ultimate economies and lowered production costs.

"The applicability of the suggestion for immediate attention to repairs, betterment, and replacement work will naturally vary greatly with different industries. Each trade association is in position to ascertain this for its industry, and in its own way and through its own channels to bring the matter immediately to the attention of its members. The suggestion is offered to you with confidence that all practicable co-operation will be given you.

"In connection with efforts along these lines, it will be distinctly helpful if you could set up some way to estimate the volume of the expenditures for repairs and betterments that will result for 1930, as compared with 1929, and particularly for the first three months of 1930, compared, if possible, with the corresponding period of the past year.

"It is quite likely that for the purpose of checking progress and comparison to guide action which may later be helpful, we shall in the near future suggest to you some method of reporting progress at given intervals.

"We are communicating to the chambers of commerce throughout the country the suggestion for immediate attention to repairs, betterments, and replacements to the end that co-operation through community effort of business men, home owners, and government authorities may also be enlisted."

* * * *

American Foundrymen's Association Plans 1930 Convention

SELECTION of the Cleveland Public Auditorium for the 34th annual convention and the 23d exhibit of foundry equipment, machines, and supplies of the American Foundrymen's Association, to be held the week of May 12, was made because of its exceptional facilities for housing the affair. The auditorium and annex together afford accommodations for practically unlimited exhibit requirements in the way of space and power.

All convention sessions will be held in the meeting rooms of the Auditorium. Exhibits will be opened at noon on Monday, May 12, in both Auditorium and Annex. The closing hour on Tuesday, Thursday, and Friday will be 5:00 p.m. However, arrangements have been made to hold all exhibits open on Monday and Wednesday until 10:00 p.m. This is being done for the accommodation of those who desire to take advantage of both the morning and afternoon convention sessions, and the plant visitations scheduled.

The Exhibitors' dinner is scheduled for Tuesday evening, May 13. Another annual event is the A.F.A. Subscription Banquet, to be given on Thursday evening.

A feature of the exhibit this year will be an educational and technical display, housed in the closed corridor connecting the Auditorium and the Annex. This exhibit will contain displays prepared by various committees of the A.F.A. and will include sand-testing apparatus, apprentice contest material, exhibits of engineering schools, castings, refractories, and a metallurgical and physical testing laboratory.

The tentative program for the convention includes sessions on metallurgy, engineering practice, management, and practical shop operation. Because of the varied interests of the members and guests attending the meeting, the sessions of this year will be organized to limit the subjects covered at any one meeting. There will be a sufficient number of sessions, however, to cover the important phases of foundry practice.

Informal round-table luncheon discussion meetings will again be held at this convention. Three such round-table sessions are scheduled, covering malleable, steel, and non-ferrous foundry subjects.

The shop operation courses will be broadened this year to include a course on the fundamentals of non-ferrous shop practice. In addition, both of the courses held in 1929 on gray iron and steel will be continued. They are being organized essentially for the practical shop man and will be conducted by leaders familiar with shop problems. Each course will consist of three or four sessions, beginning at 4:00 p.m. on the days scheduled.

* * *

Leipzig Plans Its Greatest Fair

America's growing activity in world markets is expected to be shown by the number of buyers and exhibitors attending the 1400th Leipzig fair, to be held this spring from March 2 to 12. More than 2,000 visitors are expected from the United States alone, and 100 exhibitors from this country will have booths there. The fair, a semi-annual event, has been held for seven centuries, and now visitors from more than 70

countries attend each session. Last spring, 165,310 registered buyers attended, and there were 10,171 exhibitors. Of these, there were 36 American exhibitors and 1,751 buyers. The exhibits cover a total floor space of close to 2½ million sq.ft. and are housed in 39 permanent buildings and 16 exhibition halls.

* * *

Machinery Companies Increase Earnings

Combined net profits of nineteen machinery manufacturers for the first nine months of 1929 were $88,397,192, as compared with $65,858,227 in the corresponding period a year ago. This was an increase of 34.22 per cent. Comparative figures, as compiled by Ernst & Ernst from published financial statements, are given below:

Name of Company	1929	1928
Allis Chalmers Mfg.	$3,379,340	$2,223,631
Amer. Brown Boveri	560,618	260,017d
Atlas Imperial Diesel Engine	501,961*	313,578*
Chicago Pneumatic Tool	1,057,512	585,409
Doehler Die Casting	803,331	540,160
Evans Auto Loading	781,121	642,798
Fairbanks	253,154	54,307
Gardner-Denver	1,133,900	704,618
General Electric	49,896,925	38,841,625
Intertype	649,236	433,313
Iron Fireman Mfg.	490,742	310,562
Link Belt	2,431,322	2,144,002
National Acme	2,053,544	759,385
National Rubber Mach.	349,969	326,869
National Supply	2,787,861	2,303,373
Seagrave	222,822	227,409
Sullivan Machinery	909,256	677,544
U. S. Hoffman Mach.	590,367	759,726
Westing. Elec. & Mfg.	19,544,211	14,290,035
	$88,397,192	$65,858,227

Note—Where figures published are before certain charges they have been so included here.
*Nine months ended Aug. 31.
d Deficit.

* * *

CHAIRMEN of the four standing technical committees of the A.S.M.E. elected at the annual meeting are as follows: Fred R. Low, power test codes; Robert L. Streeter, research; Harold W. Mowery, safety; and Edward J. Kearney, standardization. They will serve in their respective chairmanships for the coming year.

The Business Outlook for 1930

By Gerard Swope

President, General Electric Company

PROGRESS in the electrical manufacturing industry during 1929 has been very satisfactory in every direction. A new record of sales was established, the increase over 1928 being approximately 34 per cent. There has been a very substantial increase in the use of electric current in the home and in every field of human endeavor. It is remarkable how this increase continues from year to year.

Distinct progress has been made in the initiation of plans for the electrification of railroads, and we look forward to still greater development in this direction in the near future. Developments in electric appliances are proceeding at a rapid rate, and new uses are constantly being found for electricity, which constantly widens the field of the electrical manufacturer.

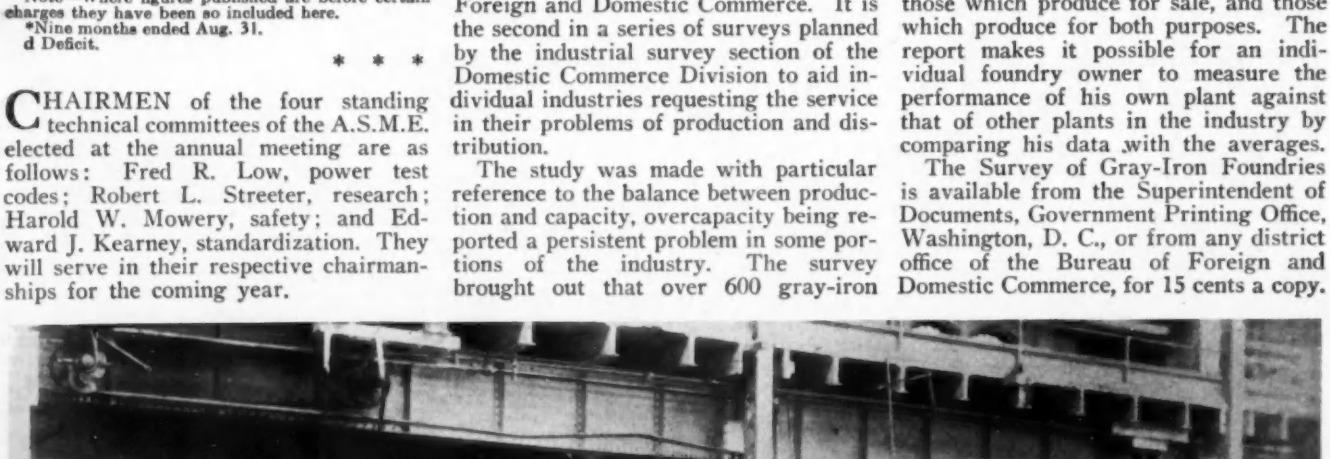
With this expansion and development in the industry, we look with confidence to a satisfactory business throughout 1930, with adequate earnings and steady employment.

Foundry Survey Issued By Commerce Department

A statistical analysis, undertaken at the request of the industry, of the operation and production of 646 gray-iron foundries in the United States has just been issued by the Domestic Commerce Division of the U. S. Department of Commerce, according to *Domestic Commerce*, the publication of the Bureau of Foreign and Domestic Commerce. It is the second in a series of surveys planned by the industrial survey section of the Domestic Commerce Division to aid individual industries requesting the service in their problems of production and distribution.

The study was made with particular reference to the balance between production and capacity, overcapacity being reported a persistent problem in some portions of the industry. The survey brought out that over 600 gray-iron foundries submitting data in response to a questionnaire operated at only 48 per cent of capacity in the two years from July, 1925, to June, 1927. A comparison of facts regarding gray-iron production in the U. S. and of different groups of foundries with a view to providing some basis for measuring efficiency by geographical districts and by size groups is attempted in the report. Comparisons are also made between plants which produce for their own use, those which produce for sale, and those which produce for both purposes. The report makes it possible for an individual foundry owner to measure the performance of his own plant against that of other plants in the industry by comparing his data with the averages.

The Survey of Gray-Iron Foundries is available from the Superintendent of Documents, Government Printing Office, Washington, D. C., or from any district office of the Bureau of Foreign and Domestic Commerce, for 15 cents a copy.



Machining one of the world's largest forgings at the Midvale Company, Philadelphia. This rotor forging for 115,000-kw. Allis-Chalmers turbo-generator weighs 269,000 lb., and is 42 ft. long

Heroic Bust of Tinius Olsen at Konigsberg

Thorsten Y. Olsen Succeeds His Father

As a result of the resignation of Tinius Olsen, pioneer builder of testing machines, president and founder of the company bearing his name, Thorsten Y. Olsen has succeeded his father as president of the Tinius Olsen Testing Machine Co., Philadelphia. H. W. Boyd, for many years superintendent and secretary, positions he continues to hold, has been elected vice-president to succeed T. Y. Olsen, who will retain the office of treasurer. The company now has about 200 employees.

Following many years training in his father's plant and his graduation as a mechanical engineer from Cornell University in 1903, T. Y. Olsen became superintendent. He was elected vice-president in 1912. He holds membership in the S.A.E., the A.S.M.E., the A.S.T.M., and other organizations.

Tinius Olsen, now in his 84th year, is a native of Konigsberg, Norway. He came to this country in the late 60's, being employed by William Sellers & Co. and other machine builders until he founded his own concern and took up the manufacture of testing machines. In more recent years, Mr. Olsen has been knighted twice by the King of Norway.

Recalling the difficulty he experienced in securing a technical education during his youth, Mr. Olsen has endowed a technical school in his native town. In recognition of this benefaction, Konigsberg has named a square for him. The school buildings will be built there. The town has also erected a heroic bust of Mr. Olsen. The school is to be conducted somewhat along the lines of Drexel Institute in Philadelphia, providing scientific education for both sexes in both day and evening classes.

* * *

MANUFACTURERS of pipe and radiator nipples have been authorized to hold a trade practice conference before the Federal Trade Commission. The meeting has not been scheduled as to time and place, but Commissioner Charles H. March has been designated to preside.

Railway Operating Income More Than $1,000,000

Class 1 railroads in the first ten months this year had a net railway operating income of $1,113,439,327, which was at the annual rate of return of 5.19 per cent on the property investment, according to reports just filed by the carriers with the Bureau of Railway Economics and made public recently. During the first ten months of 1928, their net railway operating income was $986,170,768 or 4.66 per cent on their property investment. This compilation is based on reports from 180 class 1 railroads representing a total mileage of 241,567 miles. Gross operating revenues for the first ten months of 1929 totaled $5,383,774,297, as compared with $5,160,626,177 for the same period last year, an increase of 4.3 per cent. Operating expenses for the first ten months of the year amounted to $3,818,702,641, as compared with $3,748,579,124 for the same period one year ago. This is an increase of 1.9 per cent.

Thorsten Y. Olsen

AS PART of the National Management Congress, Hotel Stevens, Chicago, the evening session on March 3 will be devoted to waste elimination. C. B. Auel, chairman of the committee in charge, has announced that the session will be the opening meeting of the committee's Elimination-of-Waste drive.

* * * *

Washington Watches Record-Breaking Machinery Exports—Ethylene Glycol and Engines—How About the Metric System?—Iron and Steel Rate Changes

By Paul Wooton

Washington Correspondent, American Machinist

WASHINGTON, D. C., Jan. 1.—With exports of machinery totaling approximately $600,000,000, the year 1929 is the greatest that machinery exporters have ever known. Exports of industrial machinery alone will reach a total of some $260,000,000, as compared with $206,000,000 in 1928. Walter H. Rastall, chief of the machinery division of the Bureau of Foreign & Domestic Commerce, attributes the increase to better salesmanship by American manufacturers in promoting their products in foreign markets. The $260,000,000 total reached by American manufacturers represents approximately 35 per cent of total international trade in industrial machinery, a condition which, Mr. Rastall states, should spur on American exporters in their efforts to increase their sales abroad. Exports of machine tools will reach a total of $40,000,000 for the year, as compared with $34,000,000 in 1928.

As far as military flying is concerned, engines cooled by ethylene glycol offer many advantages over the air-cooled type and are being regarded with preference in the purchase of new equipment where speed is an important factor. When it is realized that as speed increases the resistance increases by the square, it is pointed out, the superiority of liquid cooled motors for fast flying can be easily understood. Engines cooled by ethylene glycol offer one-fourth the surface resistance of the ordinary water-cooled type and much less than those cooled by air, it is stated. It is also pointed out that planes powered thus have greater lifting capacity.

Research is also being undertaken to apply this cooling medium to automobile engines. Ethylene glycol is expected to permit operating temperatures 100 deg. higher than water-cooling permits.

So far as the committee on coinage, weights, and measures of the House of Representatives has been advised, there is no opposition to consideration of the bill proposing that the Secretary of Commerce undertake an investigation that will set forth exhaustively the relative advantages and disadvantages of the metric system. There is strong objection to another bill before the committee which authorized the Department of Commerce to "standardize" the yard to the meter, the quart to the liter, and the pound to 500 grams. For that reason it is doubted if any consideration will be given that bill until the Commerce Department investigation proposed will have been acted upon.

Operation of the Interstate Commerce Commission's order placing iron and steel freight rates on a mileage basis has been postponed until March 20, 1930. Railroads had requested postponement until June 20 explaining that it would be impossible to complete by Dec. 20, the effective date of the order, computation of the mileages upon which the new rates will be based. In trunk line territory alone, there must be computed 900,000 distances between 500 origins and 1,800 destinations.

BUSINESS · BAROMETER

Prospects of easier money grow brighter, with more staple markets for both agricultural and industrial products

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

THE week that includes the ending of one year and the beginning of another is rarely one of great business activity. The Christmas shopping has been done, and there is a tendency to relax a little before taking up afresh the problems that confront us. Among these problems there are two questions which thrust themselves upon us at this season. One is, can we by close study acquire a pre-knowledge of the economic future? The other is, would such knowledge be of benefit to us if we had it? The recent boom in the stock market was in part a result of a belief that we had entered a new economic era in which a close study of the past would enable us to forecast the future. That there are some men who are clairvoyant in business is a mistaken belief.

Therefore, it is futile to point out that the future is unknowable, and that there are thousands of unthought-of possibilities that may change it. Even those who are most sagacious cannot protect themselves against what is yet to happen except by heeding certain time-honored generalizations that are about as obvious as the Decalogue. One of these generalizations is that each year finds the world richer despite its wars and its waste. The other is the rapidity with which consumption adjusts itself to production and the changes made necessary by labor-saving machinery or new methods. The only thing to be feared is that we may over-estimate the rapidity of our national progress and over-discount the rate at which our wealth increases from day to day.

Even the discouragement and pessimism that a financial panic creates has almost entirely disappeared. For this great credit is due President Hoover. He has regimented the forces of optimism most effectively, and averted a psychological depression by encouraging people to be cheerful.

Available indicia of business indicate a surprisingly small recession in trade during November, and so far as they are obtainable, the December figures are even more encouraging. Car loadings and bank clearings are running remarkably close to those of last year, and the spring promises to usher in a season of unusual activity in the building trade. The steel mills are quiet, and many of them were shut down over the holidays. But this is partly seasonal, and automobile output is increasing.

Staple commodity markets are in a peculiarly interesting position. Recent investigations show that there are over 125 commodity exchanges in this and other countries. Merchandise is bought and sold for future delivery on about 65 of these exchanges. Just at present, some of the world's most important and essential commodities are selling at or below what is believed to be the marginal cost of production. Among them are: Coffee, sugar, rubber, silk, cotton, and perhaps wool.

It is almost axiomatic that the production of the great staples decreases when it becomes unprofitable to grow them. Therefore, it is quite possible that we may be upon the eve of a worldwide contraction in the supply of some of the raw materials upon which civilized society has become so dependent. This possibility is engaging the minds of many thoughtful men, and when considered in connection with the inflation that may follow the adoption of President Hoover's spending policy, it cannot be ignored. Thus, the steadiness this week of the commodities dealt in on the exchanges has attracted much attention.

The plan of the Interstate Commerce Commission for consolidating the railroads of the United States attracted the attention of the theorists. Public interest in the matter is, however, surprisingly slight, and the chief bearing that the proposals of the commission have upon the present situation is that the railroads will probably be encouraged to improve their properties by way of intrenching themselves against consolidation more effectively.

In Europe, the dominating note is also one of optimism. Business seems to be becoming more active, and the recognition of the Soviet Government by Great Britain is expected to open up an important sector to English commercial enterprise. In China and India, the political unrest seems to be becoming chronic, but those who are most closely in touch with the situation do not appear to be apprehensive, and no serious disturbance to the world's peace is presently indicated. The attack on the president of the Argentine Republic, as well as the attempt to assassinate the Crown Prince of Italy, are sporadic outbreaks to which no great or widespread political significance is attached, and it is questionable whether the risk of being a president or a king is any greater today than it was one or two centuries ago.

Prospects of easier money after the New Year seem brighter, and with an abundance of lendable capital we ought to have stable markets for our agricultural products as well as our factory output. In the circumstances, a spring of good business appears to be indicated, unless each of us is successful in persuading his associates that there is more pleasure in thinking that we are miserable than in forgetting our few sorrows and determining to be happy and prosperous.

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From this page the reader will get a quick picture of current business and industry. The boxed material below is a summary of the letters from regional correspondents of the American Machinist, published in full on the opposite page.

OPENING a new year with considerable optimism, machinery and machine-tool dealers throughout the country report 1929 a record-breaking year. For some dealers, quotas have been doubled; and few dealers have reported sales less than quota. Manufacturers are still busy, and expect to be so for several months to come. As a result of their efforts, deliveries are improving steadily. Prices are steady and inquiries are picking up. New orders are expected about Jan. 15, and the time between now and then will be used for reorganization.

HOLIDAY festivities occupied the center of the stage in New York, the week's business being mainly for replacement. New England looks forward to the export and utility trade. Cincinnati dealers report a sales gain of 25 per cent during the year. The past week's business was scattered. Cleveland conditions are uncertain, with the auto-parts market picking up. Philadelphia inquiries are brisk, and the railroads are expected to buy.

MILWAUKEE dealers report business better than in any year except 1928, with a large number of lists expected. Chicago conditions are unchanged, with inquiries coming in for future deliveries. Conditions in Buffalo are slow, with the tendency to fill immediate requirements evident. Detroit reports the market steady but slow, with inquiries scarce.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

NEW YORK

Although turkeys and cranberry sauce have been occupying the attention of machinery and machine-tool purchasers in the New York district, dealers have been endeavoring to catch up with plans and other details which have been neglected because of the continuous rush of the year just closed. The week's business was mainly for replacement, few orders being reported for any other purpose. A few machine-tool builders bought equipment, but the majority of sales were to widely diversified industries in single-tool lots. Little change is expected until around Jan. 15, when officials at present in the West Indies for the holidays and boards of directors confronted with the 1930 budgets settle down to work.

One dealer reported the best week's business in some time, but that condition was unusual. Most dealers reported the usual holiday slowing up, which, if anything, is less noticeable than in previous years. Inquiries are showing continued improvement, and prospects are good for a year as good as 1928. No one believes that the high levels of 1929 will be attained in 1930. Optimism is general. All indications point to an exceptional year in all lines, with a wide variety of industries buying. The railroads are expected to go ahead with their projected plans for improvement. The New York Edison Co. and associated companies serving Greater New York will spend $76,850,000 for improvements during 1930, and machine-tool dealers expect to get their share, either directly or indirectly.

Deliveries are picking up steadily. Prices remain unchanged. The used-tool market is continuing comparatively slow.

NEW ENGLAND

The machine-tool industry in New England, with the New Year in the offing, looks back upon a prosperous year of many remarkable achievements, truly more remarkable than during the unprecedented boom of World War days. The 12-month period brought genuine success both in profit and in progress.

Looking backward, it may be seen that three industries contributed largely to this success and to the strides made within the machine-tool industry itself, namely: the automotive, aeronautic, and electrical. It is doubtful, too, if the machine-tool industry ever before experienced the tremendous distribution of small tools that has featured the entire twelve months of 1929.

On the threshold of the New Year, the machine-tool builders have encountered a period of watchful waiting. The outlook for the new twelve-months period, as expressed by representative dealers and manufacturers, is good. Prospective demand from a few industries is problematical. The automobile field, which contributed so heavily to business during 1929, is one of these. Officials are not looking forward to as large a volume of business from this source as was booked last year.

Present indications bear out this anticipation. Orders from the automotive field declined through November and December, and it is certain inquiries are not as promising now as at this time last year. The aeronautical industry, just now marking time, holds more promise even than was noted last year, as does the electrical industry. Power-plant development is a strong factor with leading utilities planning heavy expenditures.

Foreign expectations run high, and New England tools show a popular demand. The Soviet Government may continue as a heavy buyer, since it seems to be planning development of many manufacturing industries. Germany and France also give promise of heavy buying here.

CINCINNATI

It is estimated that the machine-tool manufacturers made a gain of slightly more than 25 per cent in sales during the past year. The largest individual gain was estimated at 50 per cent, and the smallest was estimated at 22 per cent.

Manufacturers are optimistic for the future, but as a result of present conditions in the general business world they are loth to make any definite predictions. The consensus is that 1930 will be a satisfactory year, perhaps with sales equal to those of 1929, and in no event with any material recession of business.

In this connection it was pointed out by some that the greater part of the past year's volume was made up of small orders, from small users. During the coming year, it is thought, the average sale will be larger, due to an increased amount of buying by railroads, automobile manufacturers and other large users of machine tools.

The past week's business was well scattered geographically and the sales were equal to those of the previous week. The principal buyers were miscellaneous small users, whose requirements were largely confined to single pieces of equipment. Inquiries flowed in freely during the week, from all sections of the country, the major portion being from small users, whose requirements were single tools and replacements.

Selling agents report that they made a substantial gain in the past year and express confidence that they will be able to make a further gain in 1930. This branch of the trade had an excellent volume of sales in the past week.

CLEVELAND

Although 1929 was satisfactory from a financial standpoint for a large number of manufacturers and dealers in machine tools, the new year prospects appear to be uncertain. The slowing down of buying in the last quarter of 1929 has dampened the ardor of the trade insofar as making predictions for 1930 is concerned. Much depends upon the automobile manufacturers for continued good business.

The president of a large dealer concern says: "We showed an increase in sales for every month of 1929 with the exception of December. I do not believe that we will repeat this record in the coming year. The falling off of building construction and the anticipated decrease in automobile production will have a tendency to retard buying. Price-cutting is expected and it will naturally be harmful. I hardly expect to see any active business until April."

Another dealer makes the following statement: "I look for a very quiet year. Business at the present time is at rock bottom. January and February will be a repetition of December and November. It will be late in the first quarter before business reaches a normal stride. More energy and hard work will be required to obtain a satisfactory amount of orders. The automobile industry, the largest buyer of tools, must adhere to the old law of supply and demand in production."

The president of an automatic tool company is a little more optimistic. He states: "The feeling that there is a business depression is gradually dying away. The machine-tool business, which is widely diversified, reflects prospects as readily as anything will, and in our case, the backlog of orders is good and orders for certain models run through May. We have had no cancellations."

Another hopeful sign is the recent announcement by a large auto-parts manufacturer: "The new year is going to be bigger and better. We have received releases of auto parts in such quantities of late as to cause us to abandon shutting down for the usual inventory taking. January business in our Detroit plants will be up 100 per cent from that of this month. If these indications mean anything, automobile production will be fairly brisk by February."

PHILADELPHIA

The machinery and machine-tool market in Philadelphia was somewhat dormant during the last two weeks so far as sales were concerned, but inquiries were rather brisk. Most of the requests for prices and dates of delivery came from the territory immediately surrounding this area, although some were from the Middle West. They were mostly for industrial equipment, including shapers, millers, planers, and the like. The territory from which they came extended as far west as Cleveland and Detroit.

The impression prevails among most of the dealers, manufacturers, and sales representatives that the market will see considerable activity in the New Year. The most conservative officers of production companies base this belief on the soundness of the economic structure of the nation as a whole and of this area in particular.

The decline in orders during the last fortnight was attributed to seasonal conditions, which the end-of-the-year period invariably brings. The belief still prevails that the railroads will be in the market with some substantial orders next year. Forecasts of 1930 business by railroads, is said to be conservative, but indicate that the carriers are expecting a substantial amount of business.

MILWAUKEE

Although the normal holiday slack season prevails, the recession is reported not abnormal in any branch of the machine-tool trade. Some dealers report that business present and prospective during the holiday period is considerably greater than that in other recent years, except in 1928. A few orders are being received daily by both manufacturers and dealers, with an unusually large number of large orders held up until after the first of the year. The volume of inquiries is also unusually large and come from every branch of the metal-working trades, including industries which have never before been in the market for machine tools. Among such industries are paper mills, veneer mills, large woodworking plants, rubber products factories, and makers of miscellaneous metal specialties.

Lists which are expected to be released during the first quarter of the new year include those of a number of agricultural

and dirt-moving equipment manufacturers, including that of the Allis-Chalmers Manufacturing Co. for its Monarch plant at Springfield, Ill.; the Harnischfeger Corporation, and the George H. Smith Steel Casting Co., with its subsidiary, Trackson Co., all of Milwaukee.

Orders which have already been received from automobile companies have been small, in comparison with those of the past two years, and shipment has been delayed. Inquiries are liberal however, from manufacturers of pleasure cars and parts to which promises are frequently attached that the orders will be closed early in 1930.

The aviation industries are expected to be in the market early in the spring, as usual, and assurances have been given that Milwaukee plants affiliated with eastern airplane manufacturers will not be moved from the city as had been planned. Aside from the local airplane factory, there are a metal and a wooden propeller factory and several plants in which engines and other airplane parts are manufactured.

Expectations are that 1930 business will start conservatively but will develop before April 1, in volume comparable to or exceeding that of the first quarter of 1929. December business is reported variously to have been from 15 to 20 per cent below that of December, 1928, with the volume of pending business being carried over very similar to that of the previous December. The year of 1929 as a whole is generally claimed to have been better than any previous year since the war.

CHICAGO

No change in machine-tool market conditions has been noted during the last week, and none is expected until January is well advanced, when a degree of renewed activity is looked for. Inquiries are slow in coming in, and mainly are for indefinite future delivery. The year 1929 will close with a substantial balance to the credit of profit and loss. The set-back experienced during the last two months lowered but slightly the high percentage for the year. Forecasts regarding the machine-tool industry for 1930 are generally optimistic, although the high level of business reached during the present year is not anticipated. An executive of one of the leading Chicago companies operating as selling agents and dealers in machine-shop equipment, and one whose annual forecasts in the past have been marked by exceptional accuracy, views prospective business about as follows: The first quarter of 1930 will show an improvement over the final months of 1929; there will be further gains during the second and third quarters, with the last three months showing a still greater increase in sales. He estimates the total volume of business for the year at between ten and fifteen per cent less than that of 1929.

BUFFALO

While there are some inquiries out for machines and tool equipment for delivery shortly after the first of the year, the number of such inquiries does not compare favorably with the number in the hands of dealers one years ago. There are, however, inquiries out, and business is assured after New Year's, although it will probably be a month before the volume is very satisfying.

Present demand for electrical equipment is poor, inquiries being for single pieces of equipment usually. Few large expansion programs are in sight and the tendency seems to be to fill immediate requirements only.

Even at this early date, it is possible to state that 1929 business, when the final figures are in, will prove to be one of the best years in this district—probably by far the best since the war. Probably no dealer failed to make his quota and there are some who doubled it.

DETROIT

With almost all of the automotive plants closed for the annual holiday period of inventory, sales of machinery and machine tools in the Detroit area have dropped below the level of previous weeks. Inquiries are scarce, and only a few orders for replacement equipment are being received.

Detroit seems to have suffered from the slump of the past few weeks, and whether it will recover promptly is problematical.

Predictions are somewhat conflicting, but in the main are optimistic. It is indicated that conditions are likely to be improved after the first few weeks of the new year. Business men and industrial leaders have been averse to expressing definite opinions as to what the year holds for them, but lately there has been a tendency to make more concrete plans for the future.

* * *

Wisconsin Foundries Plan Merger

The McNally-Tollefson Co., Stoughton, Wis., manufacturer of gray-iron castings, has arranged for a merger of interests with the Stoughton Co., also of Stoughton. The McNally foundry will take over all of the gray-iron work of the Stoughton Co. shop, which in future will devote its attention to non-ferrous products, principally brass and aluminum castings. For some time past, the McNally foundry has been operated by the Liberty Foundry Co., Inc., Wauwatosa, suburb of Milwaukee, but it was shut down several weeks ago. It occupies a unit of the old Moline Wagon Co. plant, now owned by the city, under a lease that has approximately two years to run. John E. McNally is general manager.

* * *

Metal-Trade Executives On Advisory Board

Among the group designated as members of the Business Survey Conference Committee by the U. S. Chamber of Commerce, are a number of executives in the metal-working industries. This group will report progress from time to time, thereby disclosing the trend of business throughout the country. Included in the list are: James B. Bonner, American Iron & Steel Institute; W. W. Coleman, National Metal Trades Association; Gano Dunn, American Engineering Council; John E. Edgerton, National Association of Manufacturers; Carl A. Johnson, National Machine Tool Builder's Association; and Charles Piez, Shovel & Crane Manufacturer's Association, and president, A.S.M.E.

* * *

Mexican Plants Favor U. S. Industrial Machinery

American industrial machinery holds a dominant position in Mexico, according to a recent survey by the U. S. Department of Commerce. Last year, total imports from the United States of this class of goods reached a value of approximately $10,000,000, as compared with about half that figure in 1913. The ratio of Mexican imports of American industrial machinery, it is pointed out, has been rising steadily in recent years and there is every indication that this trend will continue.

Business Items

The Norton Co., Worcester, Mass., has opened a new district service building at Cleveland, Ohio, where all divisions of the company for the district will have their headquarters and where a stock of grinding wheels will be carried. The building is located at 1306 East 55th St., and is the third district service building built by the company within three years. The building is a two-story structure, 140x100 ft., of brick and concrete construction.

The Robert Berner Structural Steel Co. and Hetherington & Berner, 701-745 Kentucky Ave., Indianapolis, have merged and the firm will be known hereafter as Hetherington & Berner, Inc. The Hetherington holdings have been acquired by the Berner interests, the combined organization of the two companies now operating at the Hetherington & Berner plant. Robert Berner is president.

The Harry W. Leighton Co., 565 W. Washington Blvd., Chicago, has been incorporated in the State of Illinois. The company handles the line of the Buckeye Portable Tool Co., Dayton, Ohio, the Cleveland Steel Tool Co., and several other companies. Harry W. Leighton will be president ad general manager, while W. E. Thurber will be vice-president and secretary.

Hubbard Air Motors, Inc., Los Angeles, Calif., has filed articles of incorporation. The company carries an authorized capitalization of $300,000 and is incorporated to manufacture airplane starters, engines, and other parts. Directors named were Joseph H. Bowen and Floyd B. Hubbard of Los Angeles, and C. H. Eden of Glendale, California.

The Paramount Laundry Machinery Corporation, New York, has been acquired by the General Laundry Machine Corporation, New York, through an exchange of stock. John Harriman, formerly president of the Paramount company, has been elected president of the merged company.

The Barrett-Cravens Co., 1328-1342 W. Monroe St., Chicago, has been purchased by the Walker Vehicle Co., Chicago, subsidiary of the Commonwealth Edison Co. As a result of the purchase, the Barrett Co. is linked also with the Automatic Transportation Co., Inc., Buffalo.

The Stedman Foundry & Machine Works, Aurora, Ind., builder of crushing, grinding, and pulverizing machinery, has entered the swing-mill field, with a complete line of swing and ring hammer crushers, grinders, and pulverizers.

The Wagner Electric Corporation, 6400 Plymouth Ave., St. Louis, Mo., has removed its Chicago sales office and service station to 1935 Indiana Avenue.

The Stuebing Cowan Co., Cincinnati, Ohio, and Holyoke, Mass., which recently became a part of the Yale & Towne Manufacturing Co., Stamford,

Conn., has occupied the new plant in Winton Place, Cincinnati. The addition is one story in height.

The National Broach & Machine Co., Detroit, has been incorporated with $225,000 capital to manufacture machinery, tools, and castings.

The Goddard & Goddard Co., Inc., Detroit, is occupying a new factory at 12280 Burt Road, that city.

The Newman Tool, Die & Machine Works, Oakland, Calif., occupied on Nov. 1, new quarters at 1001 24th St., Oakland.

Personals

GEORGE G. SMALL, vice-president of the United Engineering & Foundry Co., Pittsburgh, has resigned and will retire from active business. He has been affiliated with the company and its predecessors for 36 years. Mr. Small was born near East McKeesport, Pa., in 1864 and became identified with the Apollo Foundry Co. and the Apollo Iron & Steel Co., at Apollo, Pa. Later he joined the Lincoln Foundry Co. in 1893. In 1901, at the organization of the United Engineering & Foundry Co., he was made manager of the Lincoln Foundry Co., Hartford. In 1905, he was elected second vice-president, and in 1915 was made first vice-president.

CHARLES E. CURTIS, president until recently of the Western Iron Stores Co., Milwaukee, has been made chairman of the board. He is succeeded as president by WALTER W. ETHIER, former vice-president. Clarence W. Krueger, sales manager, has been elected vice-president. Ralph M. Friend, formerly secretary-treasurer, will act as treasurer only, and William C. Mueller, Jr., office manager, has been promoted to secretary.

D. S. WOODS, Chicago sales manager for the Niles Tool Works Co. and the Pratt & Whitney Co., will leave for New York shortly to occupy a position in the same service in the East. He will be accompanied by Sam Hatchett of the Chicago territory sales force. William Hunter, formerly district sales manager in Philadelphia for the companies, will succeed Mr. Woods in the Chicago office.

WILLIAM LOLLEY has been elected president of the Ludlow Valve Corporation, Troy, N. Y. He succeeds JAMES H. CALDWELL, who has been president for 23 years and associated with the company since 1888. Mr. Caldwell becomes chairman of the executive committee.

H. M. DAVISON, formerly manager of excavator sales for the Harnischfeger Sales Corporation in eastern territory, has been made company general sales manager, with offices in Milwaukee.

RODNEY W. CHAMBERLAIN has been appointed sales manager of the Stanley Electric Tool Co., New Britain, Conn., a subsidiary of the Stanley Works. Frank E. Marvin and Sheridan E. McClelland of the sales department, Stanley Works, were made district managers.

GEORGE THORNE, formerly of New York and Chicago, has been appointed Los Angeles sales representative for the Alpaugh Engineering Co., Torrance, California.

CHARLES E. GALVIN has been elected presfdent of the International Steel Wool Corporation, Springfield, Ohio, to succeed J. K. Williams, resigned.

W. DOW HARVEY, formerly with the American Steel Products Co., Macomb, Ill., has been appointed general manager of the Globe Stove & Range Co., Kokomo, Indiana.

RICHARD W. NAGEL, formerly efficiency engineer for the Ex-Cell-O Aircraft & Tool Corporation, Detroit, has become sales engineer of the Brown-Morris Corporation, Detroit.

H. W. JOHNSON, vice-president of the American Coil Spring Co., Chicago, has taken charge of the new plant of the company located in Muskegon, Michigan.

W. B. PICKUP, employed in the sales department of the Positive Lock Washer Co., Newark, N. J., previous to 1925, has returned to the organization as special representative.

CHARLES E. MITCHELL has been appointed associate manager of the Gray Iron Institute, Terminal Tower, Cleveland.

FRANK W. FUNK has become managing engineer of the Jackson, Mich., division of Stevens & Wood, New York City.

Obituaries

LT.-COL. WILLIAM D. GRANT, in charge of the Christiania Machine Co., Christiania, Pa., an affiliated company of the Charles Bond Co., 617 Arch St., Philadelphia, died on Dec. 19, in Coatesville, as a result of an automobile crash near Thorndale, Pa. He went with the Bond company as a young man just out of school and had been associated with the company for over 20 years.

ELLIOT J. BROWN, chief engineer for the past 25 years of the Washburn Wire Co., Philipsdale, R. I., died suddenly on Dec. 17. He had been chief engineer at plants located at Altoona, Pa., and New Haven, Conn. He was a graduate of Juniata College and was 58 years of age.

ELDON B. PIERSE, 78, owner and operator of the Anderson Bridge & Scraper Co., Anderson, Ind., died recently at his home in that city. He was born in Marion, Ind., but had lived in Anderson for 70 years. He was prominent in industrial circles there for many years until his retirement some time ago.

G. A. TRIMBLE, 51, vice-president and general manager of the Vulcan Plow Co., Evansville, Ind., died recently. He also was president of the Hayes Pump & Planter Co., Galva, Ill., and the Peoria Seed & Driller Co., Peoria, Ill., and secretary-treasurer of the South Bend Chilled Plow Company.

IRVING T. HARTZ, president of the Morden Frog & Crossing Works, Chicago, died on Dec. 17 in that city. He had been secretary and manager of the Calumet Iron & Steel Co., and vice-president of the Morden Works. He had been president since 1907.

CYRUS A. BIRGE, 82, manufacturer and capitalist, died at his home in Hamilton, Ont., on Dec. 15. Mr. Birge was vice-president of the Steel Co. of Canada, president of the Canada Screw Co., and an executive of several other companies.

E. H. PEARSON, New York district manager of the Electric Machinery Manufacturing Co., Minneapolis, Minn., died on the morning of Dec. 7. He was a member of the American Society of Refrigeration Engineers and the A.I.E.E. He was 36 years of age.

CARL N. WATSON, 61, president of the Watson Elevator Co., Hoboken, N. J., died at his home in Ridgefield Park, N. J., on Dec. 13. He was born at Napanoch, N. Y., and in 1914 founded the company which bears his name.

ARTHUR J. LARMON, president of the Rahn-Larmon Co., Cincinnati, died at his home in that city on Dec. 25, following an illness of several months. He was 44 years of age.

HERBERT F. ELKINS, formerly factory manager for the Ingersoll Watch Co., died on Dec. 24 of pneumonia at his home in Wakefield, Mass. He was 52 years of age.

J. C. WATERBURY, president of the Waterbury Co., New York City, died at Weehawken, N. J., on Dec. 20, as a result of a fall from a train. He was 49 years of age.

SAMUEL BATES, 66, president of the Pioneer Thresher Co., Shortsville, N. Y,. died suddenly on Dec. 18 at his home in Rochester.

PRESCOTT I. JOHNSON, for many years shop superintendent of the Consolidated Machine Tool Corporation of America, died in Rochester, N. Y., on Dec. 14.

Forthcoming Meetings

AMERICAN ENGINEERING COUNCIL—Annual Meeting, Washington, D. C., Jan. 9 to 11. L. W. Wallace, 26 Jackson Place, Washington, is secretary.

SOCIETY OF AUTOMOTIVE ENGINEERS—Annual meeting, Jan. 20 to 24, 1930, Book-Cadillac Hotel, Detroit, Mich. National headquarters are at 29 West 39th St., New York City.

AMERICAN SOCIETY OF STEEL TREATERS—Semi-annual meeting, Hotel Pennsylvania, New York City, Feb. 7 and 8, 1930. W. H. Eisenman, 7016 Euclid Ave., Cleveland, is secretary.

THE WEEKLY PRICE GUIDE . . . S

Rise and Fall of the Market

IRON consumption is on the increase, with prospects of heavier sales this month. Both iron and steel prices remain unchanged, although a sign of weakness is seen in the cutting under on galvanized steel sheets. Warehouse quotations on the latter are $4.50 per 100 lb., base, with sales reported at $4.25. Slight recovery in non-ferrous metals is seen in advances this week on tin, solder, babbitt metal and scrap. Linseed oil is down 0.7c. (15.9c.) at Chicago. There is also easing off in furnace coke at Connellsville.

(All prices as of Dec. 27, 1929)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$17.69@$18.19
Northern Basic	19.90
Southern Ohio No. 2	19.90
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	19.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	15.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.76@22.26
Virginia No. 2	24.04
Basic	19.75@20.25
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	20.01
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	20.26
Basic	20.26
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.10@2.20	3.35	3.30	3.90†
No. 12	2.15@2.25	3.45	3.35	3.95†
No. 14	2.25@2.35	3.55	3.45	4.00†
No. 16	2.35@2.45	3.65	3.55	4.10†
Black				
Nos. 18 to 20	2.55	3.85	3.70	3.70
No. 22	2.70	4.00	3.85	3.85
No. 24	2.75	4.05	3.90	3.90
No. 26	2.85	4.15	4.00	4.00
No. 28	3.00	4.75	4.15	4.15
Galvanized				
No. 10	2.70@2.80	4.20	4.05	3.80
Nos. 12 to 14	2.80@2.90	4.30	4.15	3.90
No. 16	2.90@3.00	4.40	4.25	4.00
No. 18	3.05@3.15	4.55	4.40	4.15
No. 20	3.20@3.30	4.70	4.60	4.30
No. 22	3.25@3.35	4.75	4.65	4.35
No. 24	3.40@3.50	4.90	4.75	4.50
No. 26	3.65@3.75	5.15	5.00	4.75
No. 28	3.90@4.00	5.40	5.25	5.00

*Light plates. †Up to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. butt	53.74%	41.2%	55.5%	43.5%	55.5%	42.5%
3½ to 6 in. lap	50.32%	37.78%	53.5%	40.5%	51.6%	39.0%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	—Diameter in Inches— External	Internal	Thickness Inches
⅛	$0.17	1.315	1.049	.133
¼	.23	1.66	1.38	.14
⅜	.27½	1.9	1.61	.145
½	.37	2.375	2.067	.154
⅝	.58½	2.875	2.469	.203
¾	.76½	3.5	3.068	.216
⅞	.92	4.0	3.548	.226
1	1.09	4.5	4.026	.237
1½	1.48	5.563	5.047	.258
2	1.92	6.625	6.065	.28
2½	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb:

— Thickness — Decimal Fractions	B.w.g. and	Outside Diameter in Inches ½	⅝	¾	⅞	1	1⅛	1¼
		Price per Foot						
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049"	18	.17	.18	.19	.20	.21	.23	.25
.065"	16	.19	.20	.21	.22	.23	.25	.27
.083"	14	.20	.22	.23	.24	.25	.27	.29
.095"	13	.21	.23	.25	.26	.27	.29	.31
.109"	12	.22	.24	.26	.27	.28	.30	.32
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33
.134"	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.25†	4.00	4.15
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10†	5.30	5.00
Cold drawn, round or hexagon‡	3.50	3.65	3.60
Cold drawn, flat or square‡	4.00	4.15	4.10
Structural shapes	3.30†	3.00	3.10
Soft steel bars	3.25†	3.00	3.00
Soft steel bar shapes	3.25†	3.00	3.00
Soft steel bands	3.75†	3.65	3.65
Tank plates	3.30†	3.00	3.10
Bar iron (2.75 at mill)	3.25	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, 5/16-in. thick. †Up to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse— 3/32, 8.35c. per lb.; ⅛, 7.85c. per lb.; 5/32 to ¼, 7.35c. per lb.

METALS

Warehouse Prices in Cents Per Pound for Small Lots:

Copper, electrolytic, New York			19.25
Tin, Straits, pigs, New York			43.50@44.50
Lead, pigs, E. St. Louis	6.10	New York	7.00@7.50
Zinc, slabs, E. St. Louis	5.45@5.50	New York	7.00@7.50

	New York	Cleveland	Chicago
Antimony, slabs	10.50@11.00	11.60	14.50
Copper sheets, base	27.75	27.75	27.75
Copper wire, base	20.12½	20.12½	20.12½
Copper, drawn, round, base	26.25	26.25	26.25
Copper tubing, base	29.25	29.25	29.25
Brass sheets, high, base	23.25	23.25	23.25
Brass tubing, high, base	28.25	28.25	28.25
Brass rods, high, base	21.25	21.25	21.25
Brass wire, high, base	23.75	23.75	23.75

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%.....	25@26	24.30	24.30
Zinc sheets (casks).....	10.75@11.25	12.25	10.11
Solder (½ and ½).....	30.25	29.75	28@30
Babbitt metal, delivered in case lots, New York, cents per lb:			
Genuine, highest grade.....			58.00
Commercial genuine, intermediate grade.....			42.00
Anti-friction metal, general service.....			31.00
No. 4 babbitt.....			11.50

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va:

	Nickel	Monel Metal
Sheets, full finished.....	52.00	42.00
Sheets, cold rolled.....	60.00	50.00
Strip, cold rolled.....	55.00	45.00
Rods, hot rolled.....	45.00	35.00
Rods, cold drawn.....	53.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled.....	50.00	40.00
Plates.....	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper.....	14.25 @14.75	13.50	13.00 @13.50
Copper, heavy, and wire..	14.00 @14.25	13.00	12.25 @12.75
Copper, light, and bottoms	12.00 @12.25	12.00	11.25 @11.75
Heavy lead.....	4.75 @ 5.00	5.25	4.25 @ 4.75
Tea lead.....	2.87½@ 3.12½	3.25	3.25 @ 3.75
Brass, heavy, yellow.....	7.75 @ 8.00	8.00	7.25 @ 7.75
Brass, heavy, red.....	11.00 @11.50	12.50	10.25 @10.75
Brass, light.....	6.75 @ 7.00	7.00	6.25 @ 6.75
No. 1 rod-brass turnings..	9.00 @ 9.25	8.00	7.75 @ 8.25
Zinc.....	2.75 @ 3.00	3.00	2.00 @ 2.50

TIN PLATES—Charcoal—Bright—Per box:

	New York	Cleveland	Chicago
"AAA" Grade:			
IC, 14x20.....	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20.....	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20.....	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20.....	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb..	$0.13*	$0.16	$0.15
Cotton waste, colored, per lb..	.09½*	.12	.12
Wiping cloths, washed, white, per lb.....	.12½	38.00 per M	.16
Sal soda, per lb.....	.02½	.02	.02
Roll sulphur, per lb.....	.028	.03½	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.....	.159	.164	.159
Cutting oil, about 25% lard, in 5 gal. cans, per gal.....	.65	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal..	.33	.36	.24
Belting — Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin. ft., per inch of width, for single ply:			
Medium grade.....	30–10%	30–10%	35%
Med. grade, heavy wgt...	30%	30– 5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft:			
First grade.....	50%	50–10%	50%
Second grade.....	60%	60– 5%	50–10%

*Grade F.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars.....	per lb..	$0.0325	$0.0325	$0.0325
Cold drawn shafting...	per lb..	.035	.035	.034
Brass rods.....	per lb..	.2125	.2125	.1825
Solder (½ and ½).....	per lb..	.3025	.2975	.3475
Cotton waste, white...	per lb..	.13	.13	.10@.13½
Disks, aluminum oxide mineral, cloth, No. 1, 6-in. dia.....	per 100.	4.59	4.59	3.59
Lard cutting oil.....	per gal.	.65	.65	.65
Machine oil.....	per gal.	.33	.33	.30
Belting, leather, medium.....	off list..	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs...	off list..	50-10%*	50–10%*	50%*

*List prices as of April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*.....	$6.03	$6.03	$6.03
Emery cloth*.....	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†.....	2.61	2.61	2.61
Cloth†.....	4.59	4.59	4.59
Fire clay, per 100 lb. bag.....	1.00	.75	.75
Coke, prompt furnace, per net ton.....	Connellsville, 2.60@2.65		
Coke, prompt foundry, per net ton.....	Connellsville, 3.50@4.85		
White lead, dry.....	100 lb. kegs....	New York, 13.75	
White lead, in oil.....	100 lb. kegs....	New York, 14.25	
Red lead, dry.....	100 lb. kegs....	New York, 13.75	
Red lead, in oil.....	100 lb. kegs....	New York, 15.25	

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less.....	60%
Larger, up to 1 x 30-in., full kegs, list less.....	50–10%
Less than full kegs or case lots, add to list.....	10%
Fitting-up bolts: list less.....	45%
Lag screws:	
Up to ½-in. x 6-in., list less.....	60%
Larger, list less.....	50–10%
Less than full keg or case lots, add to list.....	10%
Rivets:	
Structural, round head, full kegs, net.....	$4.50
Structural, round head, broken kegs, net.....	6.00
Tank, 7/16-in. dia. and smaller, list less.....	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less.....	60%
Larger, up to 3-in., list less.....	40–10%
Less than keg or case lots, add to list.....	10%
Washers:	
Wrought, full kegs, per 100 lb., list less.....	$4.00
Wrought, broken kegs, per 100 lb., list less.....	2.00
Turnbuckles:	
With stub ends, list less.....	20%
Without stub ends, list less.....	50%
Chain:	
Proof coil, base, per 100 lb., net.....	$7.10
Cast iron welding flux, per lb., net.....	.40
Brazing flux, per lb., net.....	.80

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Calif., Turlock—Turlock Irrigation Dist.—electric welding machine.

Mich., Detroit—A. Fabry, 14871 Monica Ave.—One 400 amp. arc welder.

Mich., Melvindal (br. Dearborn)—Brown-McLaren Mfg. Co., 5853 West Fort St., Detroit—machinery and equipment for the manufacture of screw machine products for proposed 1 story, 200 x 250 ft. machine shop here. Estimated cost $100,000.

N. Y., New York—New York State Bridge & Tunnel Commission and New Jersey Holland Tunnel Commission, Administrative Bldg., Canal and Varick Sts., will receive bids until Jan. 7 for lathe and milling machine.

Alta., Vegreville—C. Gordon Lumber Co.—interested in prices on complete equipment for proposed sash mill. Estimated cost $35,000.

Que., Montreal—Canadian Carriage & Body Co. Ltd., St. Hubert St.—additional equipment for plant.

Opportunities for Future Business

Calif., Compton—Pacific Iron & Steel Co., 241 East Ave. 26th will build a 1 and 2 story, 400 x 700 and 50 x 70 ft. fabricating plant and office on South Alameda St. and Lynwood Rd. Estimated cost $500,000. P. and W. S. Davis, 3215 West 6th St., Archts. Noted Nov. 21.

Calif., Long Beach—Lockheed Aircraft Co., 523 West 6th St., Los Angeles, is having plans prepared for the construction of a new factory at Long Beach Municipal Airport here.

Calif., Los Angeles — Eastman Kodak Co., 643 South Hill St., awarded contract for the construction of a 2 story, 35 x 131 ft. factory at 1117 North Las Palmas Ave. Estimated cost $100,000.

Calif., Los Angeles — Westwood Mortgage & Investment Co., is having preliminary plans prepared for the construction of a 2 story garage on Westgate. Estimated cost $150,000. J. and D. B. Parkinson, 808 Title Insurance Bldg., Archts.

Conn., Bridgeport — Southern New England Telephone Co., 157 Church St., New Haven, is having plans prepared for the construction of a 1 story, 100 x 200 ft. garage at Charles and Federal Sts., here. Estimated cost $100,000. D. Orr, 956 Chapel St., New Haven, Archt.

Idaho, Boise—Firestone Tire & Rubber Co., awarded contract for a 100 x 122 ft. warehouse and service station. Estimated cost $50,000.

Ill., Chicago—Gior & Forguis Corp., 2108 North Natchez St., awarded contract for masonry, etc., for a 1 story, 80 x 100 ft. shop. Estimated cost $21,000.

Ill., Denville—C. M. Lewis, Adams Bldg., Archt., will receive bids in Jan. for the construction of a 1 story factory for Electric Coal Mining Machine Co., 309 St. Johns Court, Chicago. Noted Dec. 5.

Ind., Fort Wayne—General Electric Co., 1635 Broadway, awarded contract for the construction of a 6 story, 80 x 140 ft. factory on Wall St. Estimated cost $267,000.

Ind., Indianapolis—Citizens Motor Car Co., 31 West 13th St., awarded contract for the construction of a 100 x 536 ft. machine shop and garage at 1500 North Meridian St. Estimated cost $50,000.

Ind., Marion—Marion Craftsman Tool Co., N. H. Motzinger, Pres., has work under way on the construction of a new factory.

Kan., Wichita—All Steel Products Mfg. Co., 300 South Wichita St., awarded contract for the construction of a 1 story factory. Estimated cost $40,000.

Ky., Louisville—Mengel Co., Dumesnil and 11th Sts., awarded contract for a 2 story, 50 x 400 ft. factory at 1430 South 12th St. Estimated cost $50,000.

Mich., Detroit—Chicago Pneumatic Tool Co., 401 East Larned St., is having plans prepared for the construction of a 2 story, 75 x 80 ft. tool factory for assembly and service for air equipment and tools. Estimated cost $50,000. Van Leyen, Schilling & Keough, 3440 Cass Ave., Archts.

Mich., Detroit—Commerce Pattern Foundry & Machine Co., 2211 Grand River Ave., plans the construction of a 1 story machine shop, pattern shop, foundry, etc. on La Salle Blvd. Estimated cost $75,000. Private plans.

Minn., St. Paul—City, D. W. Birdsall, Clk., awarded contract for the construction of a 2 story hangar including garage, shops, etc., at municipal airport. Estimated cost $74,885. Noted Dec. 12.

N. J., Newark—Positive Lock Washer Co., Ave. A., awarded contract for a 2 story addition to factory at Ave. A. and Miller St. Estimated cost $40,000.

N. J., Newark—H. D. Scudder, Jr., 9 Clinton St., Archt., is receiving bids for the construction of a 2 story, 100 x 190 ft. service station, etc., at Central Ave. and 12th St. for Paddock & Zusi, c/o Architect. Estimated cost $150,000.

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BUSINESS NEWS DEPARTMENT
Tenth Ave. at 36th St., New York

N. J., Newark—Stoddard & Lively, 536 Lyons Ave., Irvington, manufacturers of woven belting, etc., plans the construction of a factory at 700 Bergen St. here. Estimated cost $40,000. Architect not selected.

N. J., Passaic—Owner, c/o Francis Friedman, 395 Springfield Ave., Newark, Archt., is having plans prepared for the construction of a 1 story, 140 x 150 ft. garage and repair station here. Estimated cost $150,000.

N. Y., Brooklyn—Brooklyn Borough Gas Co., 1721 Sheepshead Bay Rd., will soon award contract for the construction of a 2 story garage and shop at 805 Neptune Ave. Estimated cost $275,000. Bloch & Hesse, 18 East 41st., New York, Archts. C. E. Smith, 116 West 39th St., New York, Engrs.

N. Y., Brooklyn—M. Cohen, 50 Court St., plans the construction of a 100 x 208 ft. garage at 88th St. and 4th Ave. Estimated cost $60,000. P. Freshman, 50 Court St., Archt. Maturity in spring. Noted Dec. 12.

N. Y., Brooklyn—W. H. Nicholls, 91 Ave. 126th St., Richmond Hill, plans the construction of a 5 story, 77 x 82 ft. garage at College Pl. and Love Lane. Estimated cost $80,000. Slee & Bryson, 160 Montague St., Archts. Maturity in April. Noted Dec. 12.

N. Y., Brooklyn—Pop Sons Realties Inc., M. Handel, Pres., will build a garage at King and Van Brunt Sts. Estimated cost $40,000. J. Millman, 1780 Pitkin Ave., Archt.

N. Y., Brooklyn—U. S. Trucking Corp., 17 Battery Pl., New York, will soon award contract for the construction of a 1 story, 78 x 99 ft. garage and shop at Fulton and Hicks Sts. L. A. Sheinart, 194 Bowery, New York, Archt. Noted Dec. 12.

N. Y., Hornell—Erie R.R. Co., 50 Church St., New York, awarded contract for addition to locomotive shops, etc. here. Estimated cost $100,000. G. S. Fanning, New York, Ch. Engr. Noted Oct. 31.

N. Y., New York—Felco Realty Corp., 250 West 57th St., awarded contract for the construction of a garage at 99 Charles St. Estimated cost $50,000.

N. Y., New York—Knights of Columbus Club, 8th Ave. and 51st St., awarded contract for the construction of a bus terminal and service building. Estimated cost to exceed $100,000. Capitol Bus Terminal, 240 West 51st St., lessee.

N. Y., New York—Topping Bros., 159 Varick St., H. Edge, Pres., will soon award contract for the construction of a factory for the manufacture of wholesale hardware. Estimated cost $300,000. R. G. Cory, 30 Church St., Archt.

N. Y., New York—Waltman Realty Corp., A. Elliott, Pres., 68 East 116th St., will receive bids after Jan. 2 for the construction of a garage at Isham St. and Sherman Ave. Estimated cost $120,000. M. W. Del Gaudio, 545 5th Ave., Archt.

O., Berea (br. Cleveland)—Ohio Nut & Bolt Co., 600 Front St., awarded contract for a 1 story, 44 x 161 ft. addition to factory. Estimated cost $40,000. Noted Nov. 21.

O., Cincinnati—Cincinnati Steel Castings Co., Spring Grove Ave., awarded contract for the construction of a 1 story foundry on Spring Grove. Estimated cost $110,000.

O., Cleveland—Cleveland Commercial Auto Body Co., J. Schuldt, Secy., 1717 East 45th St., plans the construction of a 1 story factory. Estimated cost $40,000.

O., Cleveland—Sherwin-Williams Co., H. J. Hain, Mgr., 601 Canal Rd., is having preliminary plans prepared for the construction of a 1 story iron oxide plant. Estimated cost $50,000. C. Walton, c/o owner, Archt.

Pa., Erie—Times Square Garage, A. Emerman, Mgr., 10th and Peach St., had plans prepared for the construction of a 4 story, 100 x 165 ft. addition to garage. Estimated cost $100,000. Private plans.

Pa., Pittsburgh—Standard Oil Co. of Pennsylvania, Peoples Gas Bldg., awarded contract for the construction of a 1 story, 75 x 118 ft. garage and service building at 35th St. Estimated cost $50,000.

Pa., Tarentum — Tarentum Steel Co., W. Cole, V. Pres., 1716 First National Bank Bldg., Pittsburgh, bids in January for the construction of a steel mill to include mills, cranes, docks, railroad sidings, offices and equipment here. Estimated cost $3,000,000. L. F. Galbraith, Tarentum, Engr. Noted Oct. 10.

Tenn., Jackson — American Creosote Works, Inc., 1305 Dublin St., New Orleans, La., will receive bids early in January for the construction of a creosoting plant to include two high pressure creosoting cylinders 8 x 150 ft. together with the necessary tram cars, power plant and engine room equipment, here.

Tex., Abilene — Central Texas Iron Works, Waco, acquired a 6 acre site and plans the construction of a plant for the manufacture of various types of building steel here.

Wis., White Fish Bay (Milwaukee P. O.)—School District 1, H. S. Rogers, Dir., 230 Birch Ave., is having plans prepared for the construction of a 250 x 520 ft. high school, including two manual training shops, etc. Estimated cost $1,000,000. M. Tullgren & Sons, 20 Prospect Ave., Milwaukee, Archts.

Ont., Toronto—National Iron Corp., Cherry St., is having plans prepared for addition to cast iron pipe foundry. Estimated cost $50,000. James, Proctor & Redfern, 36 Toronto St., Engrs.

Ont., Sandwich—Sandwich Foundry Co. Ltd., Sandwich, E. Rogers, 2677 Collingwood St., Detroit, Mich., Secy. and Treas., plans the construction of a foundry here. Estimated cost $250,000.

Que., Montreal—Dominion Bridge Co. Ltd., Dominion Station Lachine, plans addition to plant to increase output 2,000 ton daily, also new plant at Weston, Ont. Estimated cost $100,000 and $200,000 respectively.